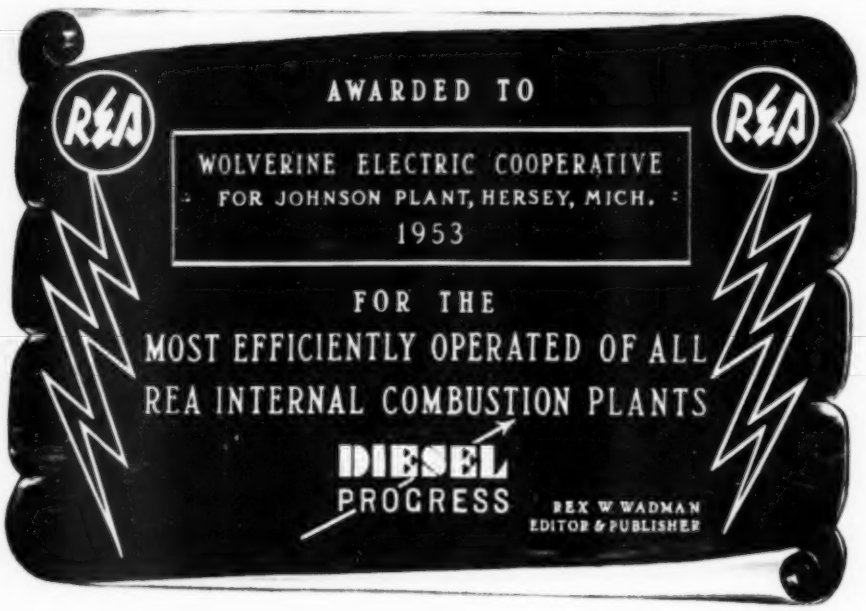
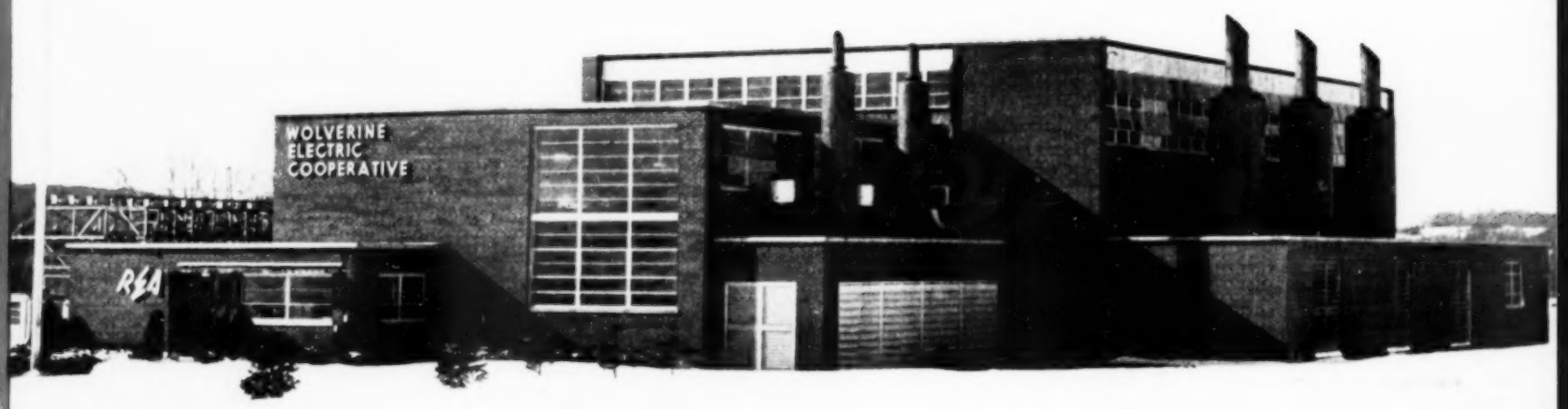
IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



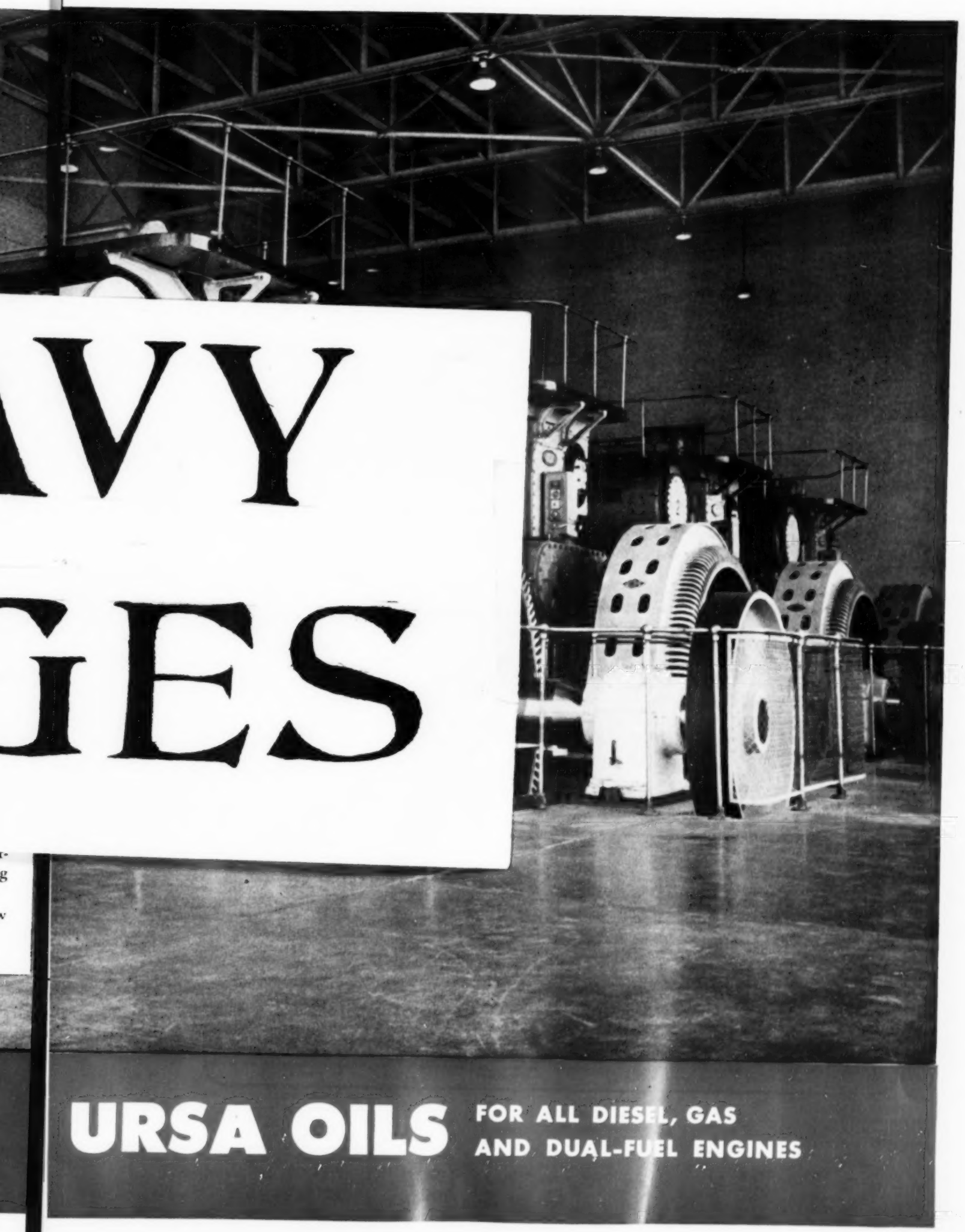


FIVE DOLLARS PER YEAR

MAY, 1954

FIFTY CENTS PER COPY

LOWER
COST
POWE
WA
PAG
efficiency at lowest possible cost. Just call the near-
est of the more than 2,000 Texaco Distributing
Plants in the 48 States, or write:
The Texas Company, 135 East 42nd Street, New
York 17, N. Y.
TEXACO
TEXACO


AVY
GES
URSA OILS
FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES

LOWER COST POWER

HERE'S HOW you can reduce your diesel maintenance costs and cut your fuel consumption: Lubricate with one of the famous *Texaco Ursa Oil* series — the one that's exactly right for your engines and operating conditions.

The *Texaco Ursa Oil* series is a complete line of lubricating oils especially refined to make diesel, gas and dual-fuel engines deliver *more power* with *less fuel* over *longer periods* between overhauls.

Best evidence that Texaco delivers these benefits is this fact —

> *For over 20 years, more stationary diesel horsepower in the U. S. has been lubricated with Texaco than with any other brand.*

A Texaco Lubrication Engineer will gladly help you select the proper oils to give you maximum efficiency at lowest possible cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO

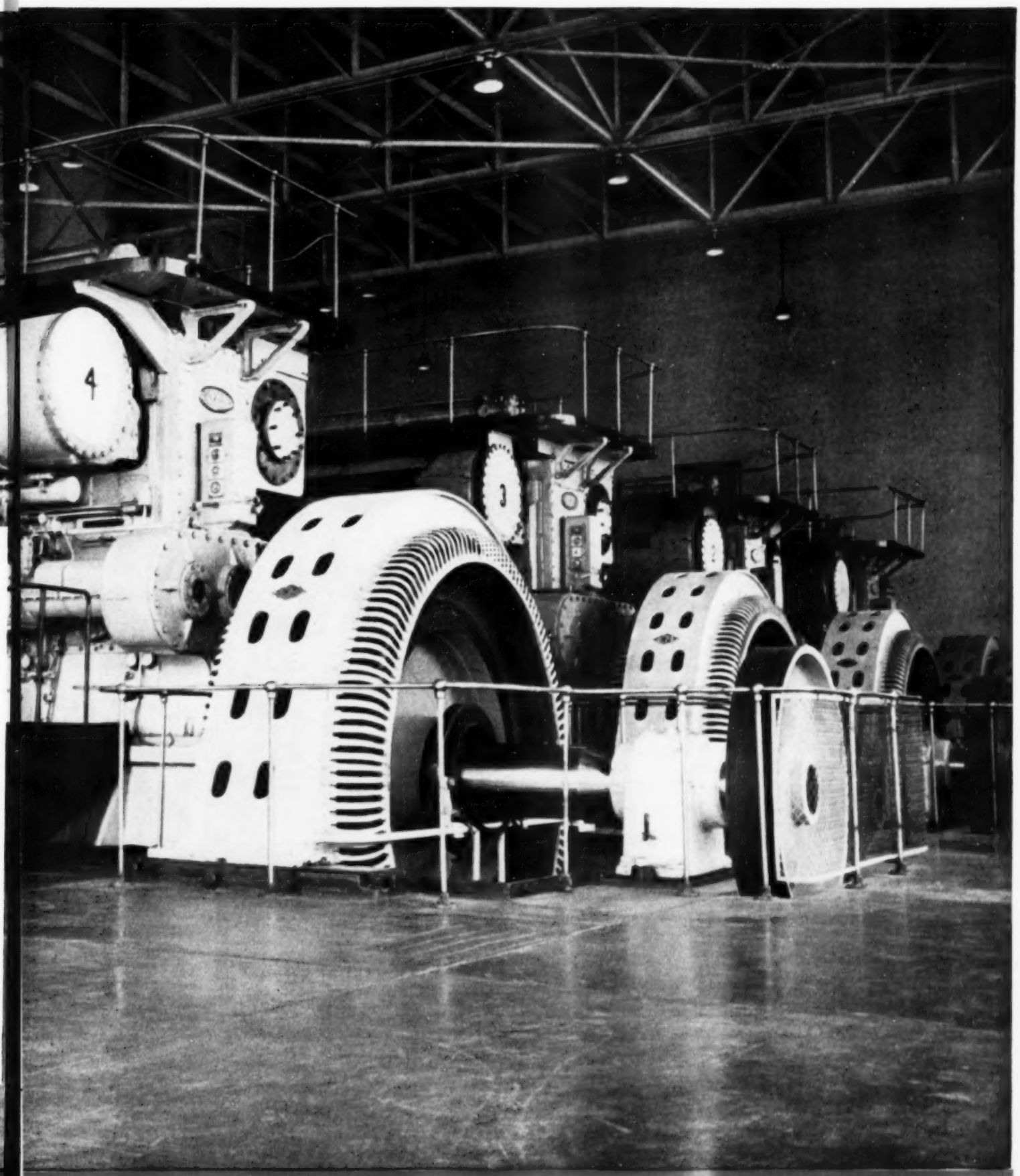
esel
on:
Oil
nes

e of
sel,
ith
.
fits

rse-
ith

elp
um
ear-
ing

ew



URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

The "MARS," designed and built to the specifications of the Cleveland Diesel Engine Division of General Motors. Design Agent—Tams, Inc., New York. Builders—Gulfport Shipbuilding Corporation, Port Arthur, Texas.

NEW STAR IN BOSTON HARBOR

GM Diesel-Electric Tug "MARS" delivered to Boston Tow Boat Company, Boston. Diesel-Electric Drive selected because of 24 years' dependable service by GM Diesel-Electric Tugs "LUNA" and "VENUS"

General Motors Diesel-Electric Drive lets the "MARS" switch from full ahead to full astern in a split second—not even the time lag of a signal between pilothouse and engine room. This modern tug can run for a month without refueling.

This maneuverability and round-the-clock availability pays off in faster docking and towing—means more work at less cost for her owners. For a survey showing how you can cut your water transportation costs with GM Diesel-Electric Drive, call or write your nearest Cleveland Diesel Engine Division Office listed below.

Diesel-Electric tugs "VENUS" (above) and "LUNA" (below) delivered in 1930 and still giving dependable service to the Boston Tow Boat Co. The "LUNA" was built by M. M. Davis and Son, Solomons, Md.; the "VENUS" by W. G. Abbott Shipbuilding, Milford, Delaware.

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO

GM GENERAL MOTORS DIESEL POWER

Tie Up to GM Service

ENGINES FROM 150 TO 3250 H. P.

SALES AND SERVICE OFFICES

BOSTON, MASS. 9 Commercial Ave., Cambridge, Mass. Tel.: Eliot 4-7891

CHICAGO, ILL. 216 West Potomac Ave., Lombard, Ill. Tel.: Randolph 6-9214

DALLAS, TEXAS. 9404 Waterview Road. Tel.: Fairdale 2403

HONOLULU, T.H. 3115-B Diamond Head Road. Tel.: Honolulu 99-9202

KANSAS CITY, MO. 1020 Jefferson Ave. Tel.: Valentine 7134

MIAMI, FLA. 2315 N. W. 14th St. Tel.: 64-6556

MINNEAPOLIS, MINN. 412 Lafayette St., Excelsior, Minn. Tel.: Excelsior 94

NEW ORLEANS, LA. 727 Baronne St. Tel.: Magnolia 6761

NEW YORK, N. Y. 10 East 40th St. Tel.: Murray Hill 5-4372

NORFOLK, VA. 554 Front St. Tel.: Norfolk 2-7147

ORANGE, TEXAS. 212 First St. Tel.: Orange 8-4226

PITTSBURGH, PA. 469 Marlin Dr. Tel.: Locust 1-2173

PORTLAND, ORE. 3676 S. E. Martin St. Tel.: Sunset 7509

ST. LOUIS, MO. 2 N. Wharf St. Tel.: Main 0642

SAN DIEGO, CALIF. 1545 Meade Ave. Tel.: Woodcrest 2340

SAN FRANCISCO, CALIF. 870 Harrison St. Tel.: Douglas 2-1931

SEATTLE, WASH. 1230 Westlake Ave. N. Tel.: Adler 1460

WILMINGTON, CALIF. 433 Marine Ave. Tel.: Terminal 4-4098

DIESEL and GAS ENGINE PROGRESS

REX W. WADMAN *Editor and Publisher*

IN INDUSTRY · IN TRANSPORTATION · ON THE SEA · IN THE AIR

ORMOND O. BLACK	*Vice President*
SIDNEY HOFFMAN	*Managing Editor*
CHARLES F. A. MANN	*Associate Editor*
BRUCE WADMAN	*Mid-West Editor*
MARY N. THOMPSON	*Assistant Editor*
PEGGY R. TOMACK	*Production Manager*
SYLVIA R. WOLF	*Mgr. Reader Service*

CONTENTS FOR MAY, 1954

The DIESEL PROGRESS Award Winning REA Plant	33
A Good Diesel Made Better	42
Crawler Tractor Features Torque Converter	44
A 600 KW. Sterling Portable Emergency Unit	46
You Too Can Use Heavy Fuel	48
Turbocharging The Two-Cycle Gas Engine	51
They Barge Into The Jungles	54
Fredonia, Kansas	57
Diesel Harvest Cuts Ranch Costs	60
What's Going On In England	64
Flexible High-Output Locomotive	68
Diesel Dredging At A Profit	70
Cat on Deadman's Curve	76

EDITORIAL AND PRODUCTION OFFICES

816 N. La Cienega Blvd. Los Angeles 46, Calif.

BUSINESS OFFICES

NEW YORK 20:
Ormond O. Black
604 Fifth Ave.
JUdson 6-4820

CHICAGO 11:
Bruce Wadman
612 N. Michigan Ave.
WHitehall 3-0919

LOS ANGELES 46:
Sidney Hoffman
816 N. La Cienega Blvd.
BRadshaw 2-6273

LONDON E.C. 4:
G. L. Fetherstonhaugh
St. Paul's Corner
Ludgate Hill

TULSA 3:
O. F. Cozier
515 McBirney Bldg.
4-5555

MEMBER OF

BPA

Business Publications Audit of Circulation, Inc.

DIESEL PROGRESS for May, 1954, Vol. XX, No. 5. Published Monthly by Diesel Engines, Inc., 816 N. La Cienega Blvd., Los Angeles 46, California. Tel. BRadshaw 2-6273. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £2-12s-6d per year. Acceptance under 34.64, P. L. & R., authorized.

DIESEL PROGRESS is indexed regularly by Engineering Index, Inc.

MEMBER OF

MPA

Magazine Publishers Association, Inc.

FRONT COVER ILLUSTRATION

The Johnson Plant at Hersey, Michigan, of the Wolverine Electric Cooperative. This REA generating plant is a two time winner of the coveted DIESEL PROGRESS Annual Award for the most efficiently operated REA internal combustion plant.

Great new line of

GENERAL MOTORS LOCOMOTIVES

11 NEW 1750-HORSEPOWER F9 UNITS TO NORTHERN PACIFIC

These new and more powerful General Motors locomotives are being added to the passenger pool handling the North Coast Limited and the Mainstreeter—two of the more than 200 famous name trains powered by General Motors Diesel locomotives. Delivery of these latest units brings the fleet of General Motors Diesel locomotives now serving the Northern Pacific to a total of 224.

General Motors Diesel locomotives outnumber all others on American railroads because twenty years' experience proves they operate on more dependable schedules—cost less to operate and maintain—*pay for themselves faster than any others!*

THE BEST LOCOMOTIVES ARE EVEN BETTER TODAY!

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

GENERAL MOTORS LOCOMOTIVES

La Grange, Illinois • Home of the Diesel Locomotive • In Canada: GENERAL MOTORS DIESEL, LTD., London, Ontario

At last...a proven better way to kill Diesel Exhaust Fumes!

NEW OCM DIESELER

Cleaner, safer air wherever you run a 4-cycle diesel engine — better control of noxious diesel exhaust fumes — that's what this tremendously important new catalytic invention means to you today.

The OCM Dieseler reduces — below objectionable levels — dangerous hydrocarbons and carbon monoxide in exhausts from all 4-cycle diesel engines. Compact catalytic units "burn out," by catalytic reaction, 65-85% of the unpleasant, harmful fumes — 80-90% of the dangerous carbon monoxide — whenever your engine is operating at over 60% load.

Think what this means almost everywhere diesel engines are used!

Now, with the OCM, it is possible for some mine operators to use standard diesel equipment underground.

Now 4-cycle diesel bus and truck operators can promote better public relations and good will by eliminating foul-smelling smoky exhausts.

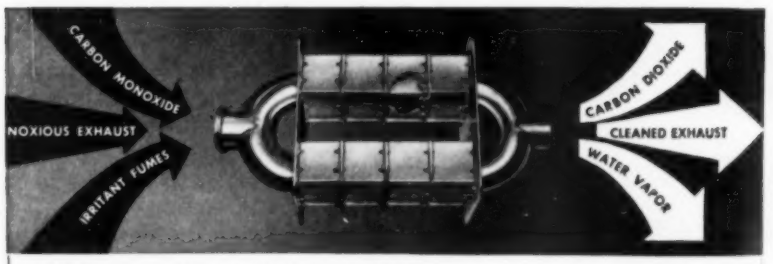
Now both stationary and mobile diesel-powered equipment can run more efficiently in industrial plants.

Requires Little or No Maintenance

The OCM Dieseler is designed to replace any standard diesel muffler. It can be connected to the engine exhaust manifold quickly and easily by your own mechanics. It is strong, compact and rupture proof. Maintenance is practically nil. Tests show that the Dieseler will give you up to 2000-2500 hours of trouble-free service before the catalytic units need renewal. Replacement is simple and low cost.

A Houdry Catalyst

The OCM Dieseler was invented by Eugene Houdry, who developed the catalytic process for cracking petroleum and who is world-renowned in the field of catalytic research. Almost anywhere you use 4-cycle diesel equipment, the OCM Dieseler can bring important benefits to you — in more efficient performance, in increased employee productivity and morale, and often in better public relations as well. Mail the coupon for complete information and technical data now.



OCM Dieseler, Duoflow model. Catalytic units (see cutaway) oxidize irritating, dangerous exhaust fumes and odors to harmless carbon dioxide and water vapor. Uniflow and Quadriflow models also available to equip almost any size engine.

OCM CATALYTIC EXHAUST FOR GASOLINE ENGINES

The OCM Catalytic Exhaust does for any engine burning non-leaded gasoline all that the Dieseler does for diesel equipment.

This Catalytic Exhaust eliminates 95% or more of the carbon monoxide — 90% of the hydrocarbons — from any engine in which you use non-leaded gasoline. With the OCM Catalytic Exhaust you can operate lift trucks, tow trucks, loaders, auxiliary generators in even closely confined areas continuously, efficiently and *safely*. Wherever you use gasoline-powered equipment indoors, you need the OCM Catalytic Exhaust.

OXY-CATALYST, Inc.

WAYNE, PA.

MANUFACTURING • ENGINEERING • RESEARCH

Fume elimination processes and equipment for internal combustion engines—for incinerators—for consumer products—and for industrial air pollution control and heat recovery.

NOTE. Dealerships for both OCM Exhausts are now available in most major markets. Write for full details.

OXY-CATALYST, INC., Wayne, Pa.

Send complete information on ☐ OCM Dieseler; ☐ OCM Catalytic Exhaust for gasoline engines.

☐ I am interested in a dealership

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

THE NEW Cycoil OIL BATH

CYCOIL TYPE "P"

The only high efficiency oil bath air cleaner that meets the lower allowable intake resistance demanded with use of turbo-chargers and pressure blowers for scavenging.

Progress always creates new problems. With modern engines making wider use of turbo-chargers and pressure blowers for scavenging, the need for an entirely new and different oil bath air cleaner was apparent. Lower allowable intake resistance was a "must" accompanied by high cleaning efficiency and large dust holding capacity. Here was a new job for Cycoil—and AAF engineers accepted the challenge. The new Cycoil, Types "P" and "PV", is their answer.

A New Method of Oil Entrainment

The original Type "W" Cycoil impinged the air upon the oil at high velocity. The new Cycoil Type "P" accomplishes this entrainment by means of a perforated plate in the air stream over which oil flows from the central distributing head.

Here's how it works. The metered orifices in the plate are calibrated to increase the velocity of air flow through the openings to entrain the oil that tends to spill over the edges and at the same time distribute the air flow uniformly over the filter area.

The air leaving the perforated plate with its oil and dust content passes upward into a conical shaped filter designed to accelerate the flow of the collected oil droplets to the perimeter of the filter out of the air

American Air Filter
COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

MODERN ENGINE DESIGN DEMANDS IT!

AAF RESEARCH SUPPLIES IT!

LOW RESISTANCE TYPE AIR CLEANER

stream. This washing action keeps the filter clean and the dirty oil flows back to the reservoir where dust and grit settle out as sludge. A secondary filter is provided to remove any oil mist that might escape the conical filter.

The oil reservoir, at bottom, is hinged to swing clear of the Cycoil casing for easy sludge removal and oil replacement. A small motor driven oil circulator supplies a constant flow of oil over the orifice plate.

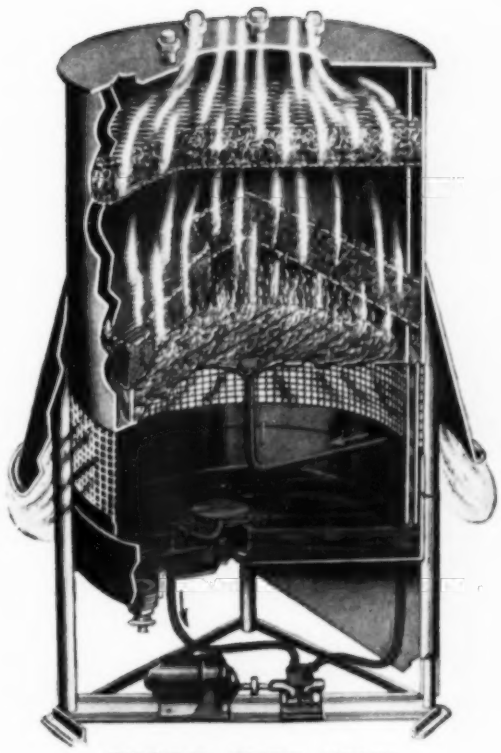
Two Types Permit High Efficiency Dust Removal From 10% of Rating To Full Capacity

The Cycoil Type "P" with standard metered orifices maintains a high efficiency in dust removal from *50% of rated capacity to maximum rating.*

The Cycoil Type "PV" is identical to the Type "P" except that hinged Vari-flow valves are added to maintain a constant ratio of orifice openings to air velocity. This single addition permits positive oil entrainment and sustained high cleaning efficiency *from as low as 10% of rating to full capacity.*

For the Hot Climates— Cycoil With Evaporative Cooler!

The Cycoil Type "P" is also available with an evaporative cooler using the perforated-plate principle to evaporate the water. This self-contained, combination unit features two perforated plates and filters in series, one flooded with water to cool the air and the other flooded with oil to remove the dust. Still another arrangement is applicable to engines using aftercoolers.



CYCOIL TYPE "PV" with Vari-flow valves

AAF **MAIL THIS COUPON, NOW!**

American Air Filter Co.
408 Central Ave., Louisville 8, Ky.

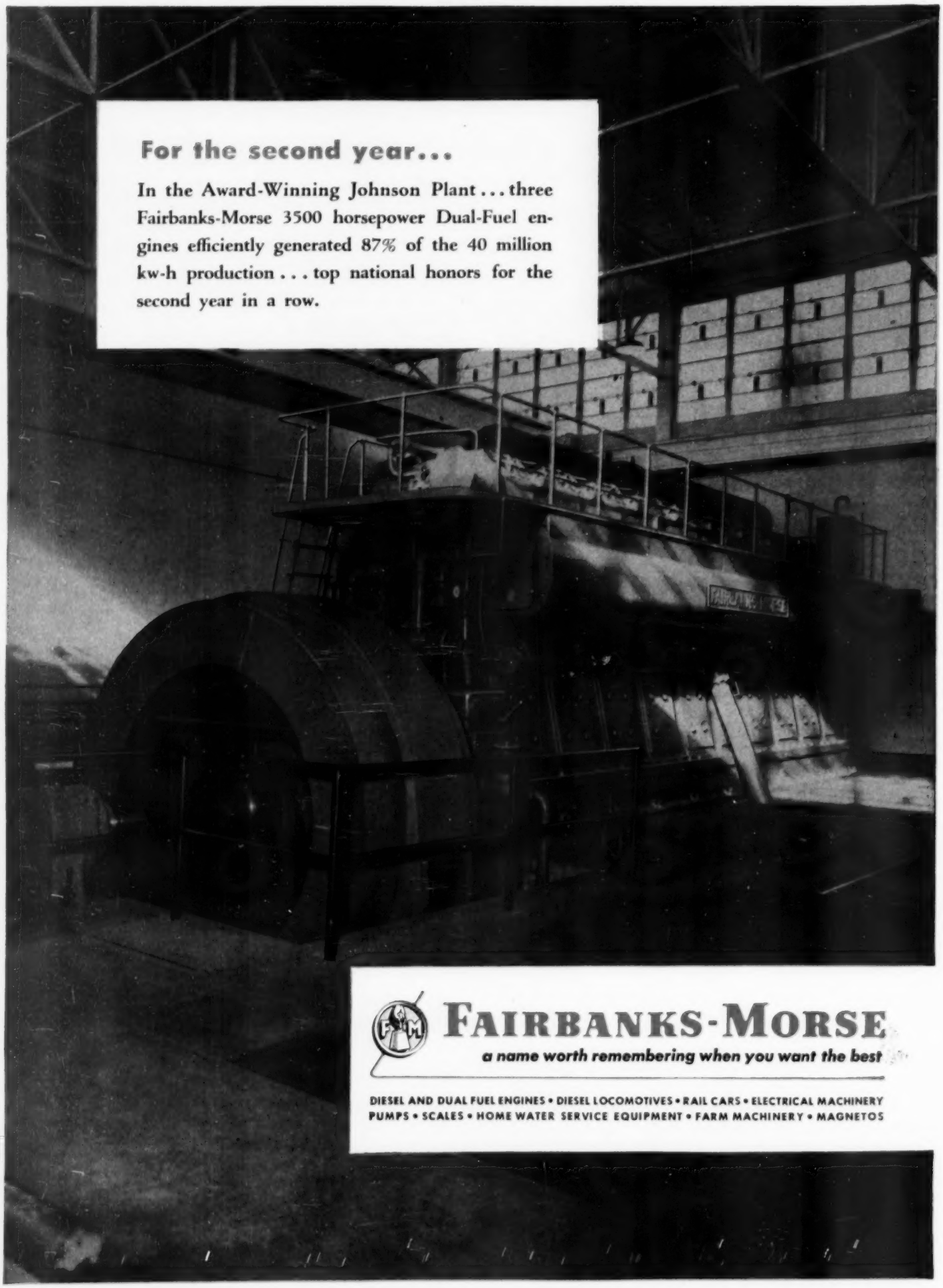
Send me free copy of Bulletin No. 160 describing the new Cycoil Low Resistance Oil Bath Air Cleaner.

Name_____

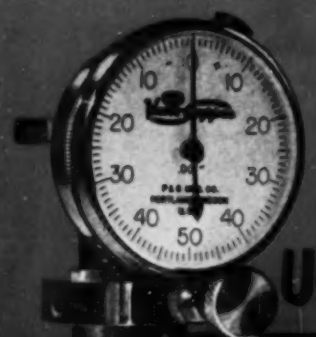
Company_____

Street_____

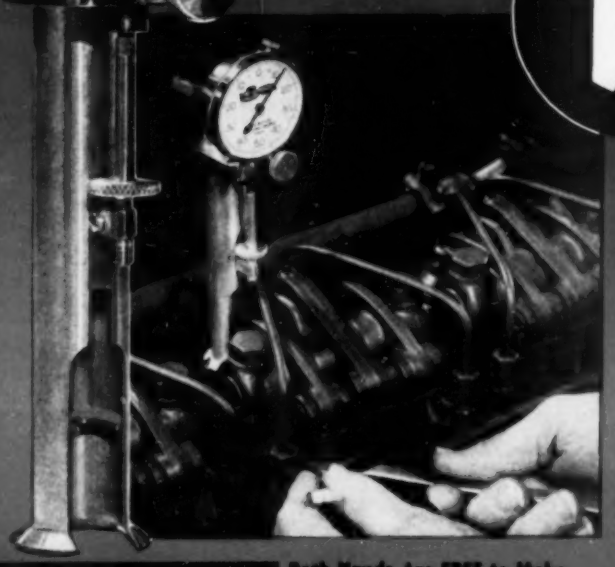
City_____ State_____


For the second year...
In the Award-Winning Johnson Plant ... three Fairbanks-Morse 3500 horsepower Dual-Fuel engines efficiently generated 87% of the 40 million kw-h production ... top national honors for the second year in a row.
FAIRBANKS-MORSE
a name worth remembering when you want the best
DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY
PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Stop Feeling Your Way!



Use the New P&G Valve-Gapper



to
- SET VALVE GAPS
- TIME FUEL INJECTORS
- BALANCE FUEL RACKS

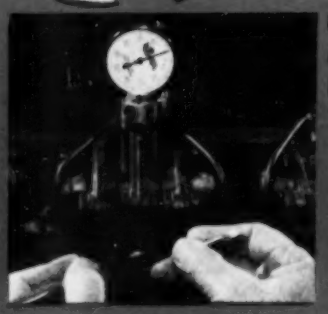
with Micrometer Accuracy

on GM DIESEL ENGINES

The Valve-Gapper is a precision instrument, utilizing an entirely new principle to adjust valve clearance, time fuel injectors and balance fuel injector racks. This new principle incorporates a dial indicator which registers the smallest variation in settings, eliminating the inaccuracies inherent in individual "feel".

The model 201 enables GM Diesel engine owners or operators, as well as mechanics to make these adjustments easily, quickly and with *micrometer accuracy.*

There is no departure from GM's recommended procedure—only the method of indication differs.



Both Hands Are FREE to Make Adjustments While Dial Indicator Registers Exact Setting

Above: Adjust Valve Gap Accurately—Valve-Gapper measures travel of rocker arm prior to contact with valve stem—both hands free to use tools.

Left: Time Fuel Injectors Visually—Dial indicator in timing attachment measures exact height of injector follower guide above injector body.

Left: Balance Fuel Injector Racks Quickly with Micrometer Accuracy—With the Valve-Gapper positioned between the control tube lever and cylinder head rim, the dial indicator registers the smallest variation in settings as other racks are matched to No. 1.

Model 111 for Gas Engines

Use this model on ALL cars with valve-in-head engines . . . as well as most makes of light trucks and pick-ups.

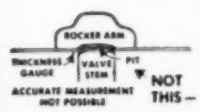
With the engine idling the dial indicator registers the *exact* clearance *before, during* and *after* adjustment. The Valve-Gapper is easy to use and reduces the time normally required for valve adjustment as much as 50%!

INSTANT LOCATION OF DEFECTIVE HYDRAULIC LIFTERS

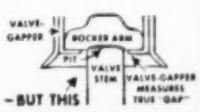
Defective or noisy hydraulic lifters can be spotted in the time required to place the Valve-Gapper on each rocker arm.

ORDER FROM YOUR JOBBER OR WRITE P&G MFG. CO.

P&G VALVE-GAPPER 100% Accurate Even When Rocker Arms Are Worn or Pitted



The dial indicator registers *exactly* the entire travel of the rocker arm prior to contact with the valve stem, but a feeler gauge blocks-off the pit, making accurate measurement impossible.



P&G MANUFACTURING CO.

2262 N. ALBINA AVENUE • PORTLAND 12, OREGON

WRITE TODAY P&G MANUFACTURING CO. Dept 2E
2262 N. Albina Avenue, Portland 12, Oregon

Please send me Valve-Gapper literature and prices.

Firm Name_____

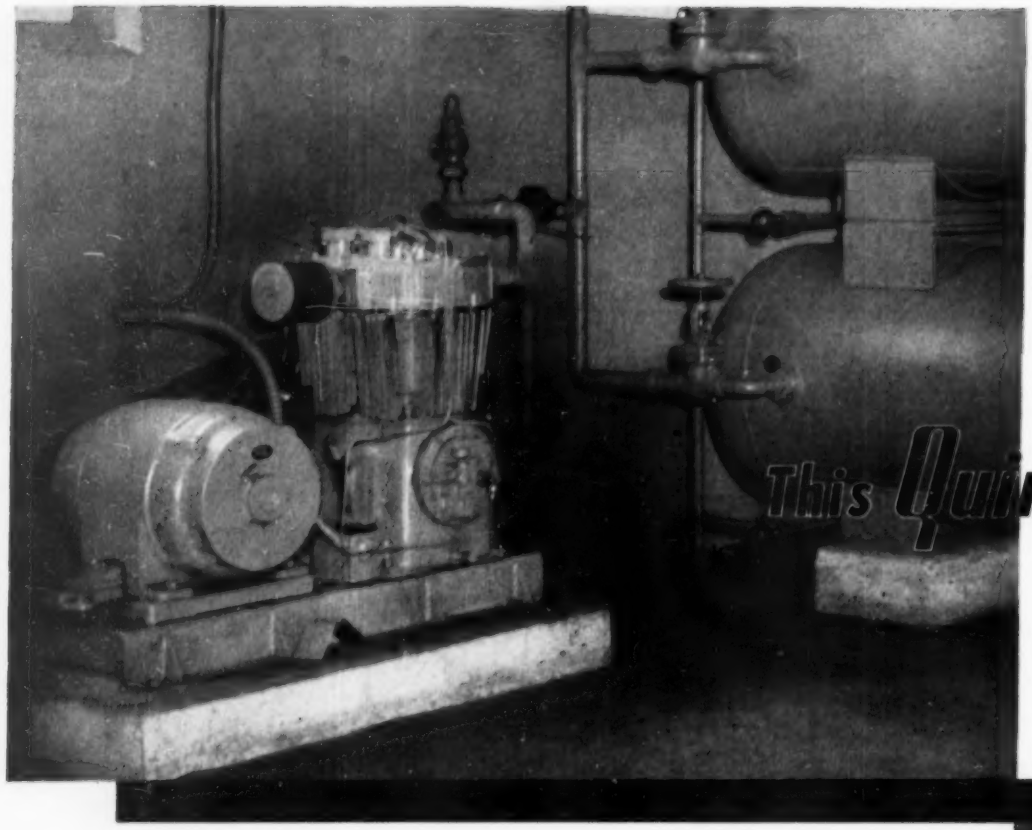
Your Name_____

Address_____

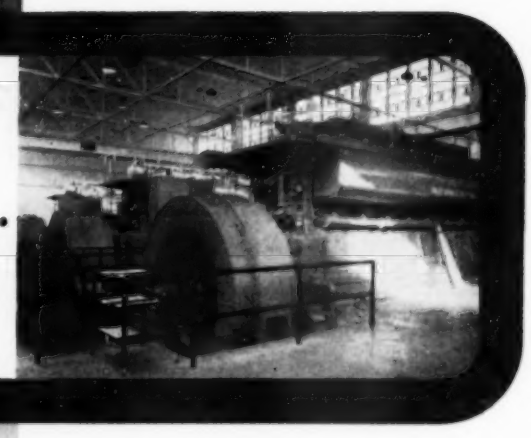
City_____ Zone____ State_____

Type of Business_____

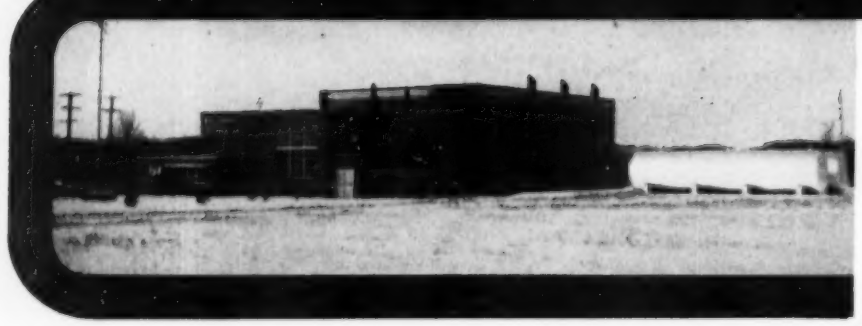
My (Dealer) (Jobber) is_____



This Quincy compressor



gives efficient starts for these diesels in . . .



. . . the most efficient REA plant of 1953

Wolverine Electric Cooperative, Big Rapids, Mich.

You'll enjoy award-winning efficiency and dependability with a Quincy Compressor, too. Quincy Compressors are modern, compact, rugged and they can be counted on when needed. There's a Quincy Compressor for *your* job. Depend on a Quincy specialist to help you select the type and size (from 1 to 90 c.f.m.) to meet your specific needs.

Quincy Compressors are Manufactured by

Quincy Compressor Co. Quincy, Illinois

Branch Offices:
New York • Philadelphia
Detroit • Chicago • St. Louis
Dallas • San Francisco

Get the Facts From Your Young Representative*

ALABAMA, BIRMINGHAM 1
Charles F. Wheelock & Associates
P. O. Box 1290, (MAIL)
205 S. 32nd St. (TELG.)
Phone: 4-6283

ARIZONA, TUCSON
Central Station Equipment Co.
2323 Aviation Highway
Phone: 3-2493

CALIFORNIA, GLENDALE 4
Haskel Engineering & Supply Co.
1236 S. Central Ave.
Phone: CHapman 5-3167 &
Citrus 3-6414

CALIFORNIA, DOWNEY
Flournoy & Everett, Inc.
9346 Stamps Ave.
Phone: Topaz 9-7406

CALIFORNIA, SAN FRANCISCO 3
C. H. Bull Company
115 Tenth St.
Phone: Underhill 1-2466

CALIFORNIA, SAN FRANCISCO 5
Transmission Engineering Co.
53 Stevenson St.
Phone: Sutter 1-4738

COLORADO, AURORA
(Eastern Suburb to Denver)
Alta Engineering Company
1988 Nome St.
Phone: Empire 6-3557

CONNECTICUT, HAMDEN 18
Pneumatic Products, Inc.
2497 Whitney
Phone: Chestnut 8-2165

FLORIDA, MIAMI 36
Aero Engineering & Export Corp.
383 Northwest South River Drive
Phone: 2-1209

GEORGIA, ATLANTA 3
J. A. Postell
936 West Peachtree St., N. W.
Phone: ATwood 8671

ILLINOIS, CHICAGO 36
Norman Engineering Company
2115 Marquette Rd.
Phone: Walbrook 5-9880

INDIANA, INDIANAPOLIS 5
L. E. Laidlaw Company
1606 N. Ill. St.
Phone: WAbash 4558

MARYLAND, ELLICOTT CITY
Cauliflower, Inc.
Phone: Ellicott City 871

MASS., SOMERVILLE 43
Pump Equipment & Engineering Co.
79 Prospect St.
Phone: Monument 6-4444, 5, 6

MICHIGAN, DETROIT 15
Industrial Air & Hydraulic Eqpt. Co.
13306 Kercheval Ave.
Phone: VAlley 2-3994

MICHIGAN, MUSKEGON
Harold J. Young
206 Montgomery Bldg.
920 Second St.
Phone: 2-2729

MISSOURI, KANSAS CITY 8
Allied Transmission Equipment Co.
1733 Main St.
Phone: GRand 5506

MISSOURI, ST. LOUIS 10
AR-Ko Engineering, Inc.
1319 South Vandeventer
Phone: JEfferson 0326

NEBRASKA, OMAHA 8
Schneider Elec. & Eqpt. Co.
1108 Farnam St.
Phone: WEbster 5550

NEW HAMPSHIRE, STRATHAM
F. Lawrence Moore
Phone: Exeter 2744

NEW JERSEY, HACKENSACK
Edwin J. Montalvo Company
City National Bank Bldg.
241 Main St., Rm. 304
Phone: Hubbard 8-8030

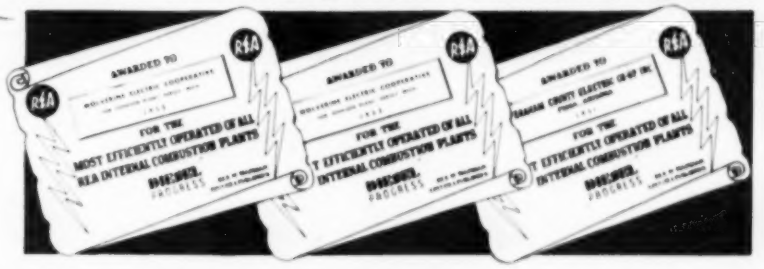
NEW JERSEY, MONTCLAIR
Ameresco, Inc., (EXPORT ONLY)
33 Watchung Plaza
Telegraph WUX
Phone: Montclair 3-5300

NEW YORK, BUFFALO 3
Louis J. Cercone
Ellicott Square Bldg.
Phone: Mohawk 5591

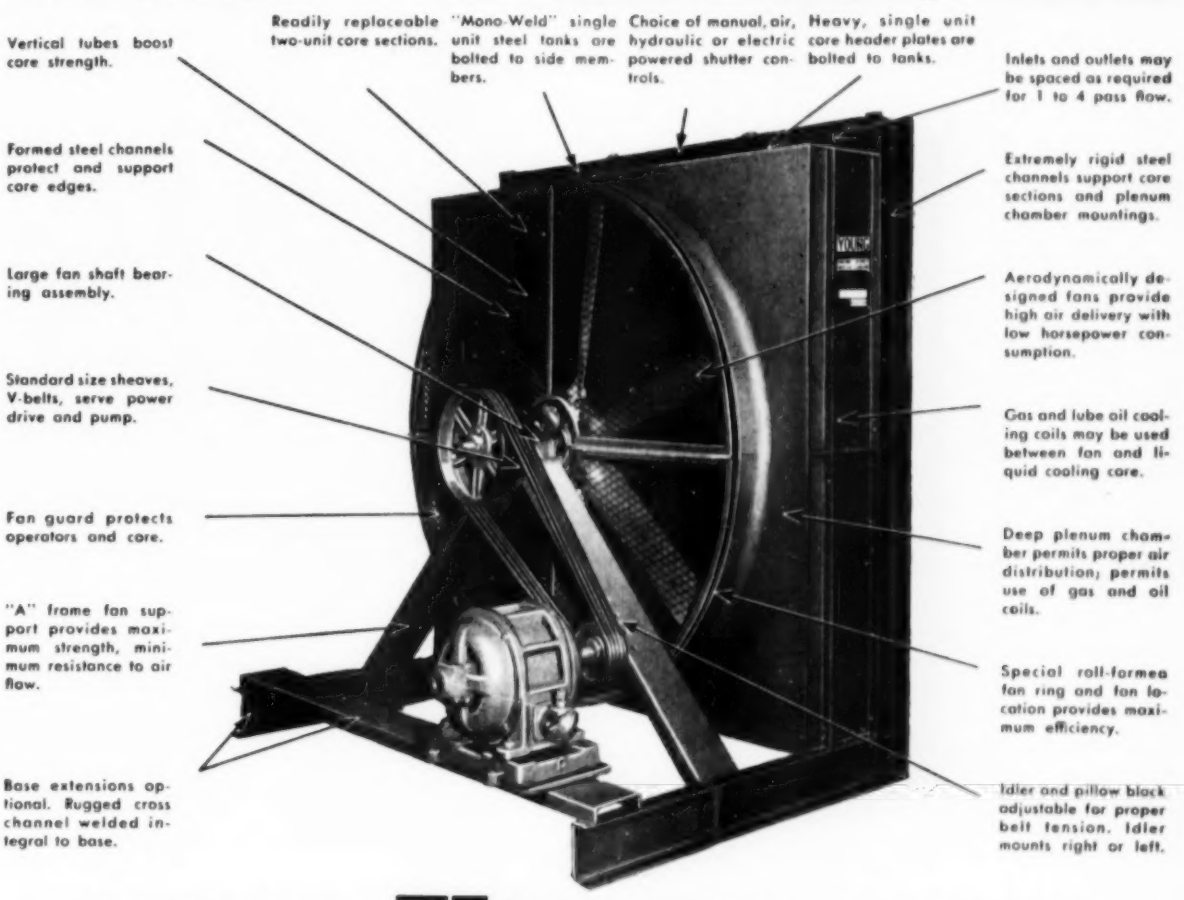
NEW YORK, NEW YORK 36
Wrightson & Adams
55 W. 42nd St., Rm. 1508A
Phone: PEnna. 6-5298, 6-5299

YOUNG FLASH!

COOLING PAYS OFF... with 3 Awards in a Row!



For the third time in a row, Young Jacket Water Coolers were used to cool the most efficiently operated REA internal combustion engine power generating plant in the world! Two 1010 hp Cooper Bessmer Diesel engines of the dual-fuel type, are cooled by Young Units similar to one shown below.

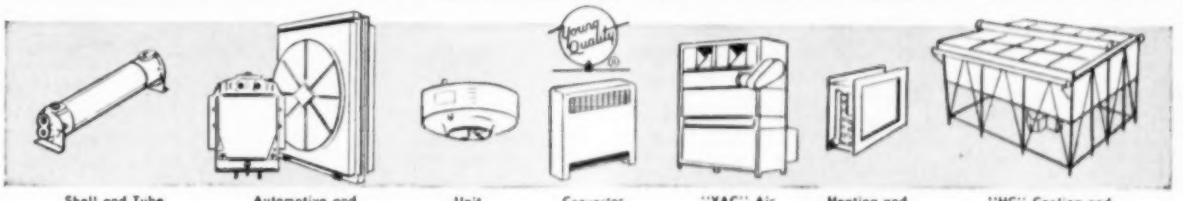

Vertical tubes boost core strength.
Formed steel channels protect and support core edges.
Large fan shaft bearing assembly.
Standard size sheaves, V-belts, serve power drive and pump.
Fan guard protects operators and core.
"A" frame fan support provides maximum strength, minimum resistance to air flow.
Base extensions optional. Rugged cross channel welded integral to base.
Readily replaceable two-unit core sections.
"Mono-Weld" single unit steel tanks are bolted to side members.
Choice of manual, air, hydraulic or electric powered shutter controls.
Heavy, single unit core header plates are bolted to tanks.
Inlets and outlets may be spaced as required for 1 to 4 pass flow.
Extremely rigid steel channels support core sections and plenum chamber mountings.
Aerodynamically designed fans provide high air delivery with low horsepower consumption.
Gas and lube oil cooling coils may be used between fan and liquid cooling core.
Deep plenum chamber permits proper air distribution; permits use of gas and oil coils.
Special roll-formed fan ring and fan location provides maximum efficiency.
Idler and pillow block adjustable for proper belt tension. Idler mounts right or left.

Heat Transfer Products for Automotive, Agricultural, Industrial, Gas and Diesel Engine Application.

YOUNG

Heating, Cooling, Air Conditioning Products for Home and Industry.

YOUNG RADIATOR COMPANY **DEPT. 404-E, RACINE, WISCONSIN • PLANTS AT RACINE, WIS. AND MATTOON, ILL.**



Shell and Tube Heat Exchangers | Automotive and Industrial Radiators | Unit Heaters | Convector Radiators | "YAC" Air Conditioners | Heating and Cooling Coils | "HC" Cooling and Condensing Units

NEW YORK, ROCHESTER 4
Keller Industrial Products
217 East Ave.
Phone: Hamilton 3255

NORTH CAROLINA, GREENSBORO
Charles M. Swart
P. O. Box 1261
Phone: 2-3174

OHIO, CINCINNATI 2
Wikel & Cornelious, Inc.
6829 Wooster Pike
Phone: Bramble 8900

OHIO, CLEVELAND 10
The Paquin Company
13405 St. Clair Ave.
Phone: Ulster 1-4100

OKLAHOMA, OKLAHOMA CITY 9
Nix Industrial Supply Company
2702 S. High St.
Phone: Melrose 2-8615

OKLAHOMA, TULSA
J. R. Meek Company
1341 S. Boston St.
Rm. 109 Bob Ward Bldg.
Phone: 4-4002

OREGON, PORTLAND 10
Hydraulic Power & Equipment Co.
2316 N. W. Savier St.
Phone: ATwater 3963

PENNSYLVANIA, BRADFORD
Jones & Laughlin Steel Corp.
106 Main St.

PENNSYLVANIA, PHILADELPHIA 3
Device Engineering Company
1701 Walnut St.
Phone: Rittenhouse 6-5163

SOUTH CAROLINA, CHARLESTON
Livingston & Haven, Inc.
P. O. Box 808 (MAIL)
2115 Meeting Street Rd. (TELG.)
Phone: 4-6321

TEXAS, HOUSTON 11
Hydroquip Corporation
6645 Navigation Blvd.
Phone: WO 8301

UTAH, SALT LAKE CITY 1
Specialty Sales Company
208 S. W. Temple St.
Phone: 22-5553, 22-5554
Telegraph FAX

UTAH, SALT LAKE CITY 10
Robert Taylor & Sons
P. O. Box 1223 (MAIL)
1077 S. Main St. (TELG.)
Phone: 22-5525

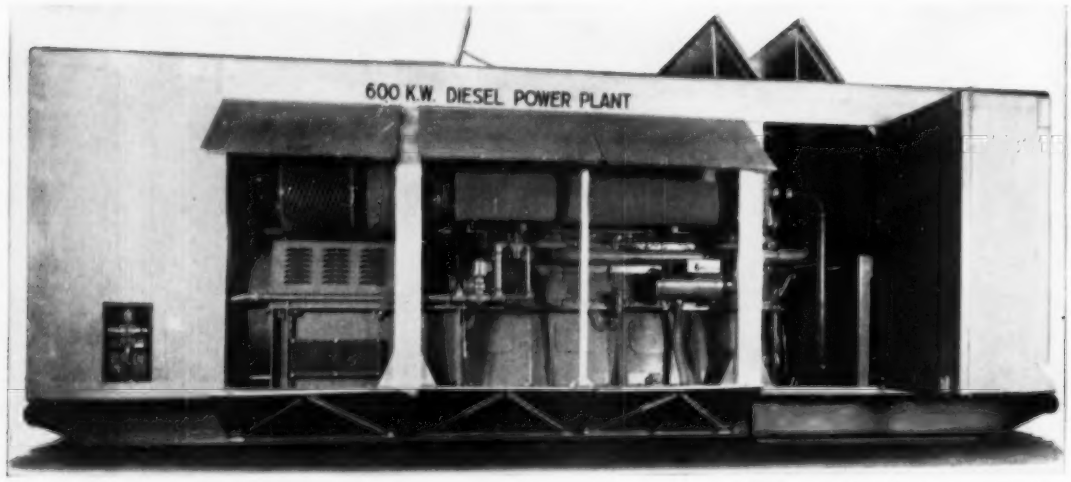
WASHINGTON, SEATTLE 2
The John F. Gertz Company
3242 Eastlake Ave.
Phone: Capitol 5484

WEST VIRGINIA, CLARKSBURG
Jones & Laughlin Steel Corp.

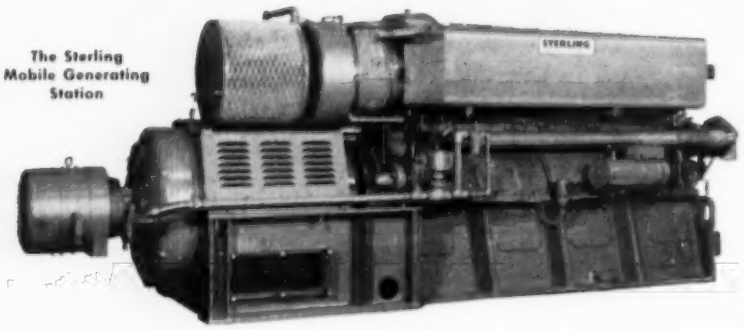
*For other representatives see the yellow pages of your telephone book.

- **An unprecedented power plant that moves on wheels ... that's ready for instant use ... ANYWHERE**

Ever see 600 KW going places along the highway?



(ABOVE) Right side view of the mobile generating plant resting on the ground in full operation. Integral jacks quickly load or unload the plant from trailer. The welded steel base provides storage space for fuel and lubricants. No foundation is required.



The Sterling Mobile Generating Station

(LEFT) Heart of the mobile plant is this powerful engine-generator set showing the Sterling diesel, the direct coupled main generator, the exciter and the turbo-supercharger. This set develops 600 KW of continuous useful power to the bus...can operate at 10% overload for periods up to 2 hours in ambient temperatures ranging from 0°F to 125°F.

The Sterling 600 KW Mobile Generating Station introduces a new concept in electric power supply. It is a completely self-contained plant that moves on wheels ...or by rail or water. It is fully equipped for independent operation...has its own integral foundation and weather-resistant housing...stores its own fuel and lubricants...has its own separate lighting and heating systems. The mobile station, singly or in parallel, supplies abundant power where you need it...when you need it... as long as you need it!

Many public utilities, private businesses, service organizations and governmental bodies are investigating the potential for this type of plant in their operations. Some plants are already in service. We'll be glad to assist in an application study. Write or call us. Send for descriptive brochure.

Picture your own applications for this unusual power station:

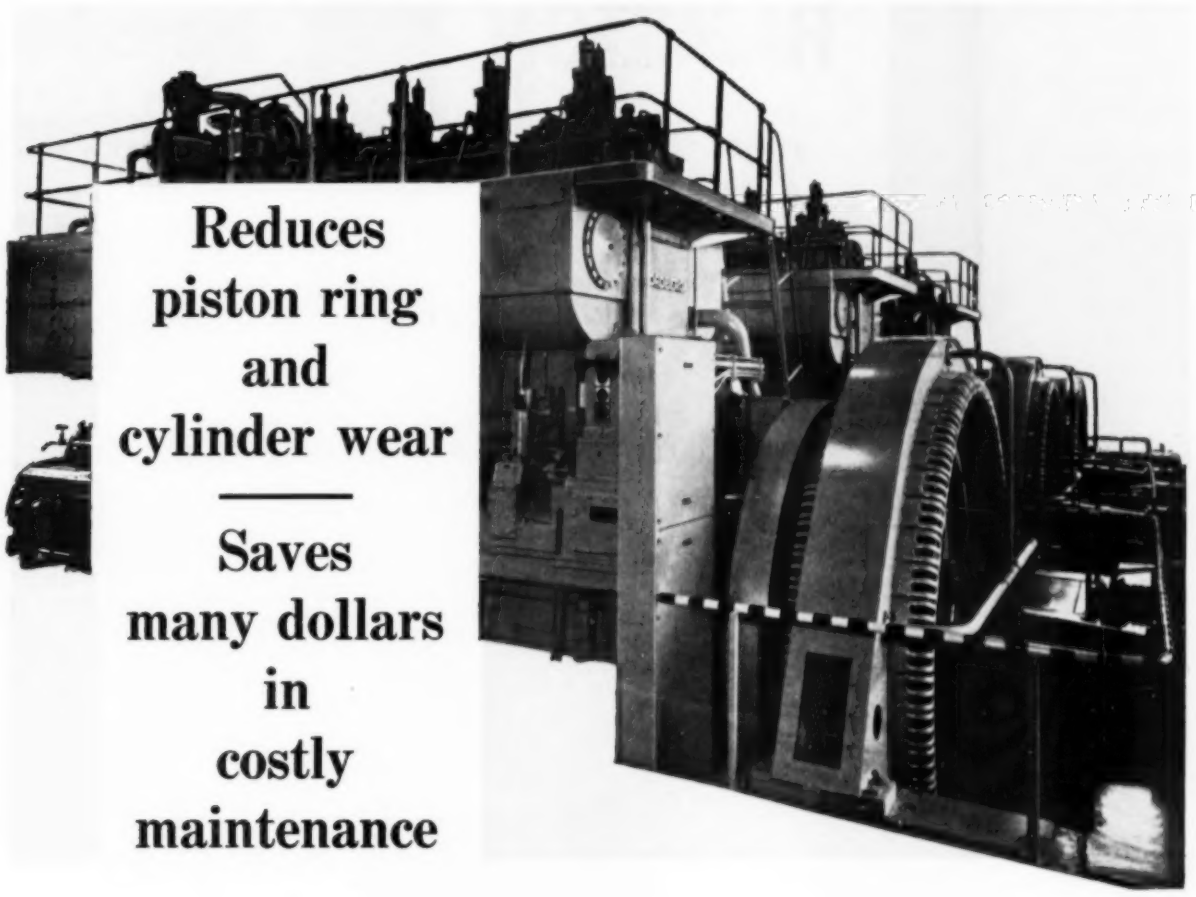
1. As a ready source of power at an out-of-way location...a new mine, construction project, oil field, etc.
2. To help handle seasonal or temporary peak loads at outlying points in a transmission system.
3. To introduce power in an area pending the design and construction of a permanent transmission line.
4. For emergency standby service anywhere.
5. For rapid transit to any locality hit by hurricane, tornado, flood, explosion or other disaster.

Mobile Power Plants from 250 KW to 1000 KW

STERLING ENGINE COMPANY

1270 Niagara Street Buffalo 13, New York

Shell Rotella Oil



Reduces piston ring and cylinder wear

Saves many dollars in costly maintenance

These dual-fuel engines in the Municipal Power Plant at Houma, Louisiana, supply dependable, low-cost electric power to the entire city. Shell Rotella Oil is the cylinder lubricant.

Here's just one of the many diesel power plants that depend on SHELL ROTELLA OIL for reduced wear of engine parts . . . lower maintenance cost.

The anti-corrosive action in Shell Rotella Oil combats the major cause of engine wear . . . cylinder and piston ring wear caused by acid action from the by-products of incomplete combustion and condensation.

Tougher lubricating film in Shell Rotella Oil gives cylinders and rings greater protection . . . minimizes wear. Its effective detergent-dispersant action prevents harmful deposits.

Write for technical information. See for yourself how Shell Rotella Oil can help reduce your engine maintenance costs.

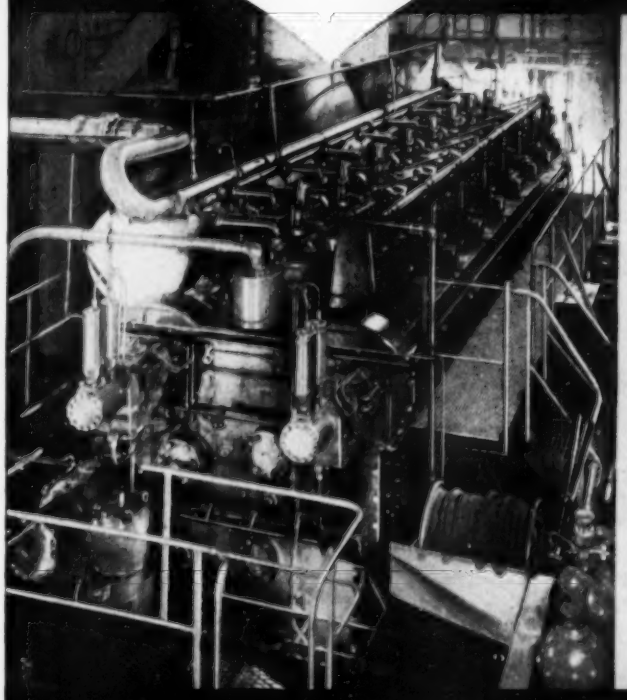
SHELL OIL COMPANY

50 WEST 50TH STREET, NEW YORK 20, NEW YORK
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA

SHELL

HAMILTON
21½ x 27½
DIESEL

burns heavy, unblended residuals like this...



ANALYSIS (by E. W. Saybolt & Co.)
of 1 Gallon Sample of #6 Fuel Oil Burned in a Great Lakes ore carrier's Hamilton engine:

Specific Gravity at 60° F.	0.9705
Gravity, API at 60° F.	14.3
Flash, PM CC	235° F.
Fire, C.O.C.	375° F.
Visc. SU at 100° F	4965 Sec.
Visc. SF at 122° F.	183 Sec.
Pourpoint, ASTM	50° F.
Saybolt Univ. at 210° F.	169
Sulfur, ASTM	0.80%
B.S. & W.	0.3%
B.T.U. Per Pound HV	18,516
Hydrogen	11.46%
B.T.U. Per Pound LHV	17,443
Oxygen (By difference)	0.90%
Specific Gravity at 160° F.	0.9358

HAMILTON DIVISION • HAMILTON, OHIO

BALDWIN • BLH • LIMA-HAMILTON

with an exhaust as clean as this!

without deposits or undue wear!

(Excerpt from letter by oil company representative)

"Each year, because of our great interest in this ship, we have had several of our engineers and technicians present at time of annual overhaul to check on the results secured from the use of our products.

"It was felt by all this year that the engine was just about the cleanest engine we have ever observed in many years of marine service. Especially so, considering the use of the varying types of heavy bunker fuel oil.

"The complete absence of varnish or other deposits, in the cylinder liners and pistons; the absence of stuck rings; and the minimum of deposits in the liner ports was remarkable. It would appear that liner wear and piston ring wear have become stabilized at a normal, or possibly even subnormal, rate."

These facts add up to this . . . for stationary or marine service, Hamilton Diesels are by far the soundest investment you can make!

BALDWIN-LIMA-HAMILTON

A Great Double-Play Combination!

THE CENTRIFUGE AND THE FILTER

The De Laval "Puri-Filter" combines centrifugal purification and micronic filtration, producing the most effective means ever devised for maintaining the quality of diesel lubricating oil. The centrifuge is the De Laval "Uni-Matic"® Oil Purifier, which removes most of the solid impurities from the oil and all water that might be present. The filter is the Fram "Filcron" Filter that removes remaining colloidal carbon and restores the oil to a translucent amber color.

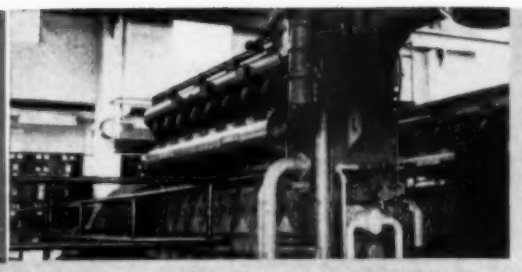
The "Puri-Filter" ***does not*** remove valuable additives in the oil. By effecting its valuable "double-play" cleansing of lubricating oil, it increases the useful life of the oil . . . and the life of the bearings as well. It minimizes ring sticking, and speeds up inspection, for crankcases are markedly cleaner when the oil is kept free of carbon, water and dirt.

THE DE LAVAL SEPARATOR COMPANY
Chicago POUGHKEEPSIE, N.Y. San Francisco

● Send for Bulletin DL-1.

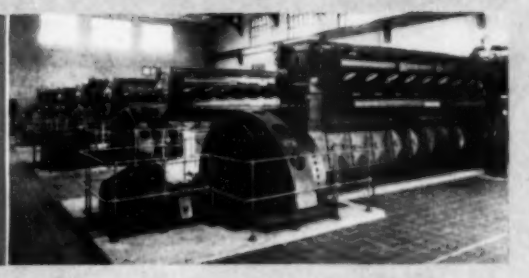
DE LAVAL *Oil Purifiers*
FOR DIESEL LUBRICATING OIL

POWER GENERATING



One of four Superior Diesels which provide power for the city of Petosky, Michigan.

SEWAGE DISPOSAL



Six, Model 80, dual-fuel Superior Engines operating on sewage gas, provide power for all plant equipment when pumping 160 million gallons daily at New York City's Owl's Head Sewage Treatment Plant.

WATER SUPPLY PUMPING

Standby generating plant for Toledo, Ohio water supply system with pumping capacity of 80 million gallons daily.

with SUPERIOR DIESELS

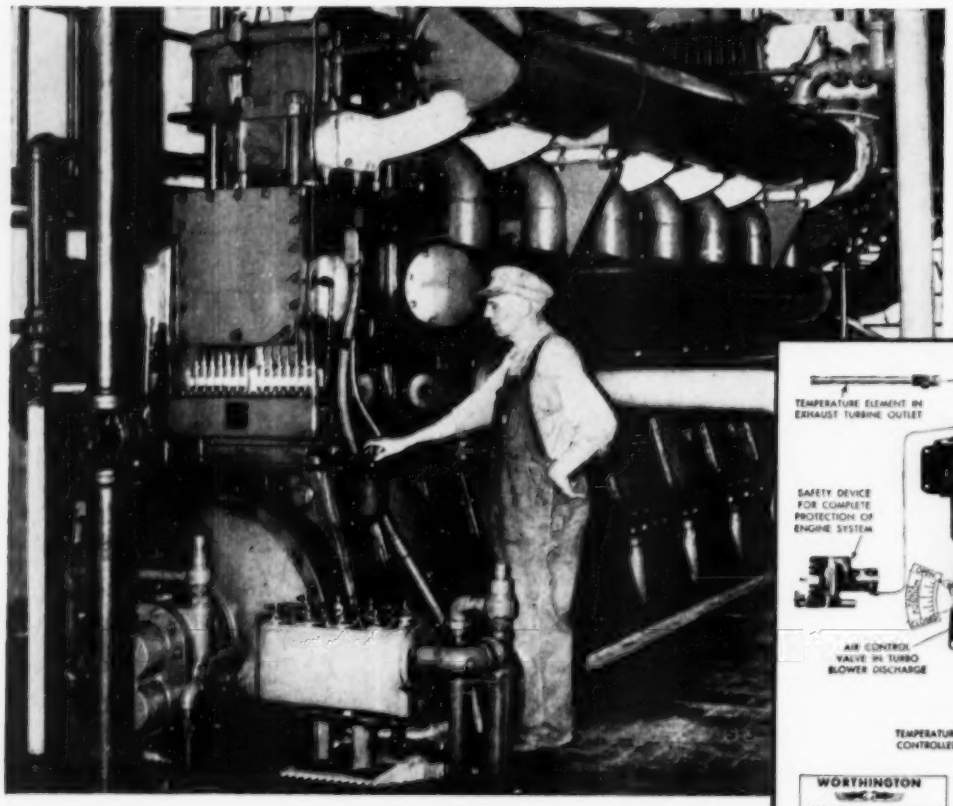
Installations of Superior and Atlas Diesels serve municipal power needs throughout the U.S.A. and in many other parts of the world. These applications are typical of the many ways in which Superior and Atlas Engines are utilized. Records kept by users of these efficient engines point up the economy and dependability of Superior and Atlas Diesels for all kinds of municipal power needs—both continuous and standby.

New bulletins describing the complete line of diesel, dual-fuel, and gas engines are now available. For specific information on the proper type of equipment for any purpose, write Springfield for the name of the Engine Division Representative in your territory.

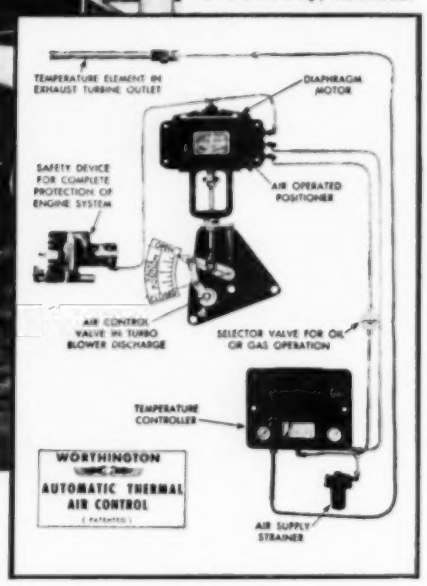
THE NATIONAL SUPPLY COMPANY

ENGINE DIVISION PLANT AND GENERAL OFFICES: SPRINGFIELD, OHIO

SALES AND SERVICE POINTS: Gloucester, Massachusetts • Houston, Texas • Fort Worth, Texas • San Diego, California Oakland, California • Terminal Island, California • Ketchikan, Alaska • Washington, D.C. • Chicago, Illinois • Portland, Oregon • Astoria, Oregon • Casper, Wyoming • Halifax, Nova Scotia • Vancouver, B.C. • Toronto, Ontario • Park Rapids, Minnesota • New York, New York • Seattle, Washington • New Orleans, Louisiana • Pittsburgh, Pennsylvania



WORTHINGTON 1,000-KW CAPACITY SUPERCHARGED DUAL FUEL DIESEL with Worthington's Automatic Thermal Air Control, used in conjunction with municipal steam generating plant at David City, Nebraska.


TEMPERATURE ELEMENT IN EXHAUST TURBINE OUTLET
DIAPHRAGM MOTOR
SAFETY DEVICE FOR COMPLETE PROTECTION OF ENGINE SYSTEM
AIR OPERATED POSITIONER
AIR CONTROL VALVE IN TURBO BLOWER DISCHARGE
SELECTOR VALVE FOR OIL OR GAS OPERATION
TEMPERATURE CONTROLLER
WORTHINGTON
AUTOMATIC THERMAL AIR CONTROL
AIR SUPPLY STRAINER

Cost-per-kw down over 60% with Worthington Dual Fuel Engine

David City, Nebraska—this city has proof that the Worthington Dual Fuel Diesel can reduce power-plant operating costs.

Engineering of this installation—made in August, 1949—was under the direction of Black and Veatch, Kansas City, Mo., Consulting Engineers. At the present time the unit operates at only one-third capacity in supplementing steam power generation.

In spite of these poor load conditions, the David City plant's overall operating cost per kw was down 60% the first year this engine was used.

ONE BIG REASON YOU GET MORE EFFICIENCY FROM THIS ENGINE

Worthington's Automatic Thermal Air Control—an exclusive patented Worthington feature—is one of the biggest reasons you get more efficiency from this dual fuel engine—or from Worthington gas engines.

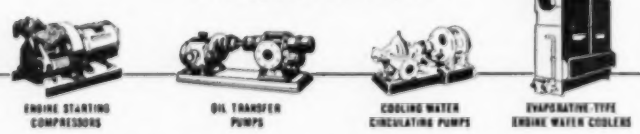
Unlike any air throttling mechanism dependent on governor action, this unit is actuated by engine exhaust temperature.

It maintains optimum air-fuel ratio at all times; provides automatic variation of air quantity in direct relation to ambient air temperatures; automatically compensates for changes in the heating values of the gas fuel (this would require manual adjustment where air-throttle controlled governor is used); maintains highest fuel economy at all loads regardless of changes in air temperature or fuel quality.

Worthington engines can increase *your* plant's efficiency and lower its operating costs. For more facts on Dual Fuel or other engines, gas or Diesel, write for bulletins to Worthington Corporation, Engine Division, Buffalo, N. Y.

E.3.1

Worthington-Built Auxiliaries



Economical Continuous Power—Diesel Engines, 150 to 2,100 hp . . . Gas Engines, 190 to 2,100 hp . . . Dual Fuel Engines, 345 to 2,100 hp.

WORTHINGTON Engines

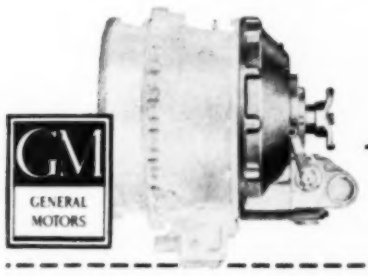
FIELD TESTS prove regular service brake linings last up to 8 times as long in trucks equipped with Allison TORQMATIC BRAKES. But increased brake lining life is only part of the story. The new TORQMATIC BRAKE also enables safer downhill hauling for heavy-duty trucks — speeds job-cycle time — boosts production — cuts maintenance costs.

On downhill hauls, the TORQMATIC BRAKE saves the regular friction brakes for complete stops or "snubbing" on curves. There are no wearing parts to burn up or wear out. Oil does all the braking work. The TORQMATIC BRAKE is installed as an integral part of the drive line in trucks equipped with Allison TORQMATIC DRIVES—uses the same oil as in the TORQMATIC Converter so there are no freezing problems in winter.

Proved in field tests

A Western contractor hauling 34-ton loads down 7% grades reports the TORQMATIC BRAKE helped increase daily round trips 50%—let him safely *triple* downhill hauling speeds — extended brake lining life 8 times.

If you're hauling on hilly, mountainous downhill runs, you can cut costs and increase production with Allison's TORQMATIC BRAKE. For full details, fill in the coupon and mail it today.



Allison

TORQMATIC BRAKE

Newest Member of the Torqmatic Drive Line

ALLISON DIVISION OF GENERAL MOTORS
Box 894D, Indianapolis 6, Indiana

Please send me Bulletin SA 1026 with full details on the new Allison TORQMATIC BRAKE.

NAME _____

POSITION _____

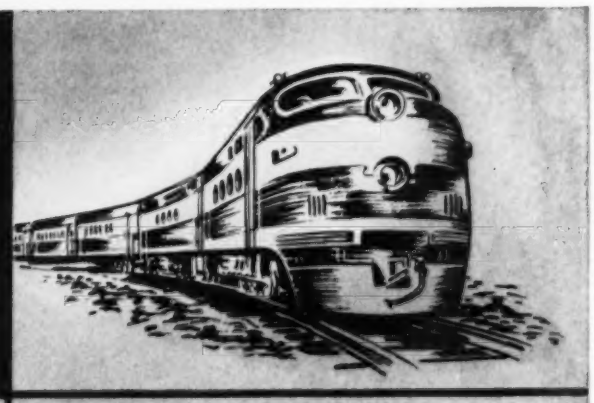
COMPANY _____

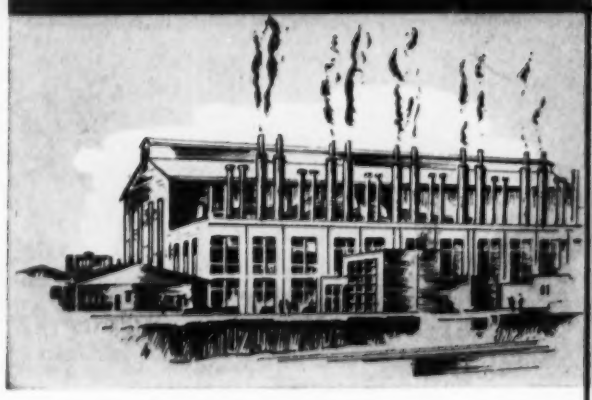
ADDRESS _____

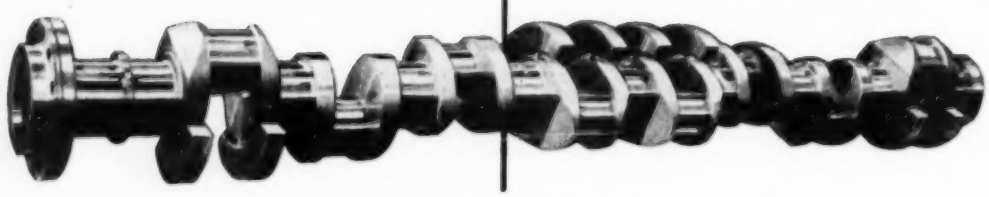
Dependable

Transmission of Power . . .

ERIE FORGE Diesel Crankshafts!

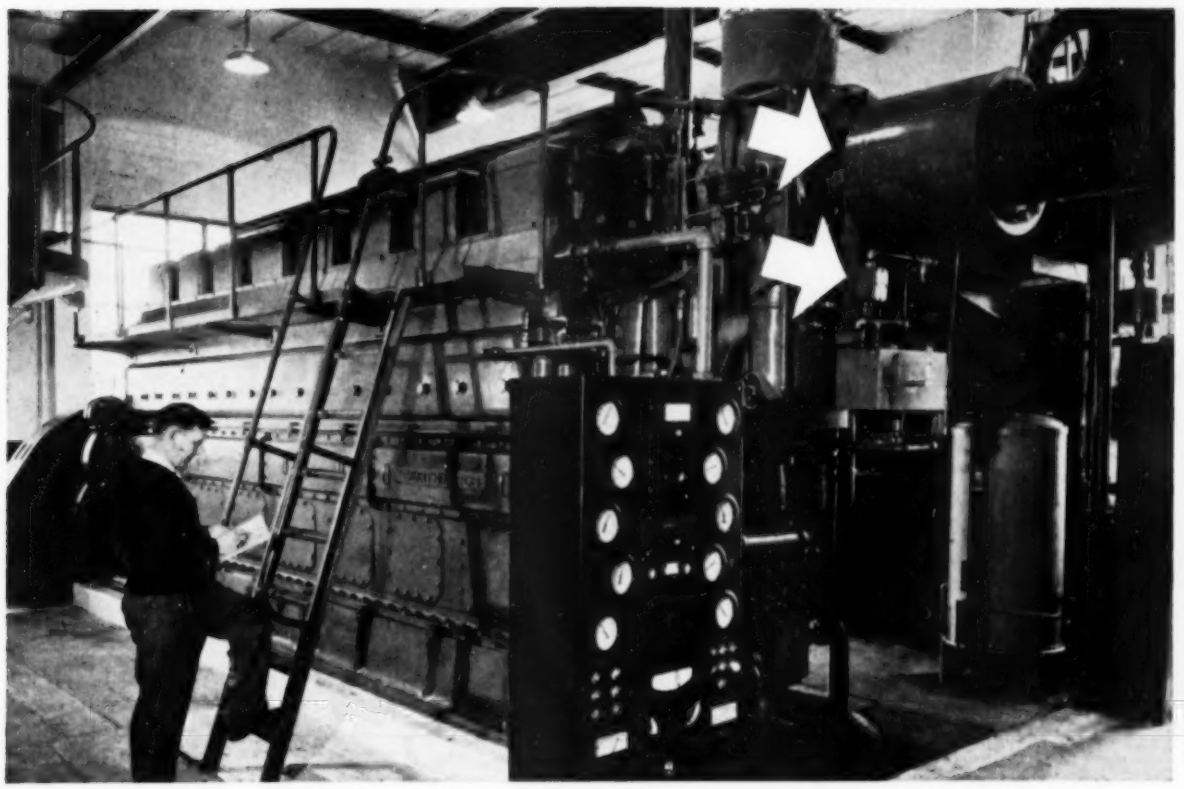






Here's the "Giant in the Diesel" . . . transmitting power that drives the modern railroad engines, pushes huge ships speedily and surely through the waves, or runs the power plants of business and industry. Erie Forge crankshafts are produced — from pouring of ingot to finished product — in our own plant. Every step is under the complete control of experienced craftsmen . . . one control, one responsibility. At Erie Forge you get the full benefit of our know-how and experience in the production of highest quality crankshafts — of exactly the right material to meet the most rigid requirements. Consult with Erie Forge on your next shafting requirements.

ERIE FORGE & STEEL CORPORATION
ERIE, PENNSYLVANIA



Air-Maze in-line silencers muffle intake noise of Worthington diesels in municipal power plants

WORTHINGTON USES AIR-MAZE in-line silencers on the air intakes of their diesels in Waverly, Iowa and Le Sueur, Minnesota municipal power plants. The Minnesota installation is pictured above. These in-line silencers muffle intake noise when air is piped from a remote point.

Air-Maze in-line silencers reduce the noise level of the vibrating column of intake air to a point where it ceases to be objectionable. Other types of Air-Maze silencers help eliminate pressure waves—usually the most objectionable part of the noise, though not always the most apparent from instrument readings.

Where the noise problem is caused by vibrations of unusual frequency, an Air-Maze silencer can be built to handle your problem.

Mounted below the silencer is an Air-Maze oil separator. It removes the oil particles from the crankcase ventilating air but lets the air pass on through. Safer operation is insured.

With a background of twenty-nine years experience and thousands of applications, Air-Maze, the filter engineers, have met practically every diesel filtration and silencing need. Air-Maze serves the industry with a complete line of intake silencers, oil-bath filters, lube oil strainers, fuel filters, and other products. For help with your filter problems, contact your nearby Air-Maze representative or write The Air-Maze Corp., 25000 Miles Rd., Cleveland 28, Ohio.

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
The Filter Engineers

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS

EXPERTS ON THE DRAWING BOARD

The skills and experience of the men who design Pritchard cooling towers is your assurance that Pritchard can give you the best answer to cooling problems, in your diesel operation.

In years and years of accumulated experience, these Pritchard engineers have learned how to meet the complex cooling requirements of modern industry. Learned so well, in fact, that every Pritchard-designed tower is *guaranteed* to do the job specified for it.

You can have such dependable cooling performance. Choose experienced design by Pritchard!

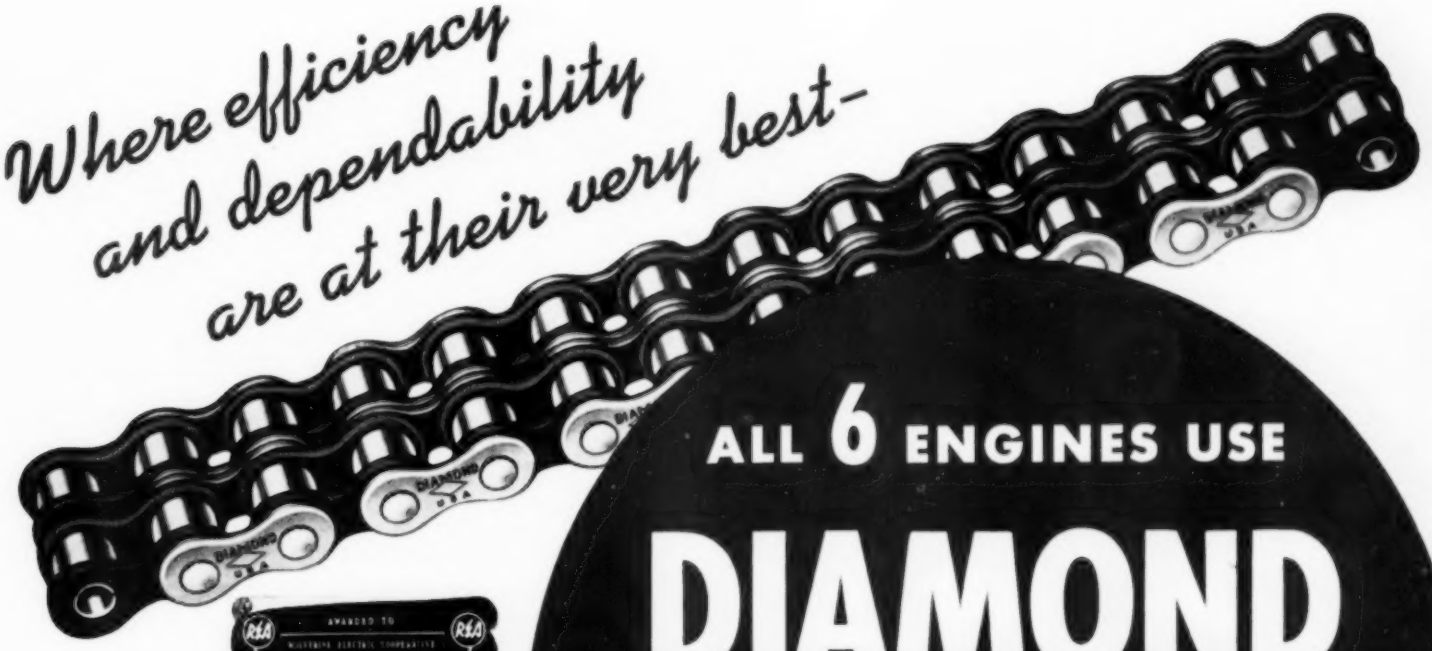
Industry's Partner for Progress

J. F. Pritchard Co.
OF CALIFORNIA
A DIVISION OF J. F. PRITCHARD & CO.
Dept. 382, 210 West 10th St., Kansas City 5, Mo.

COOLING TOWERS
SPECIALIZED HEAT EXCHANGERS
GAS & AIR TREATING EQUIPMENT

Representatives in Principal Cities from Coast to Coast

Where efficiency and dependability are at their very best—



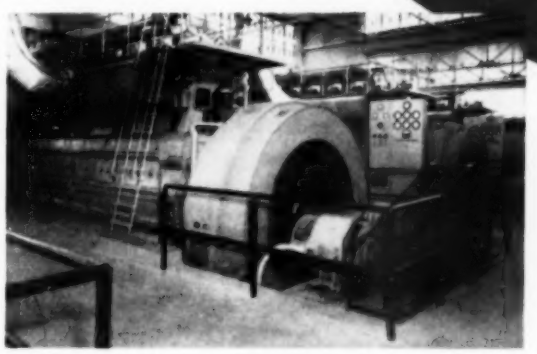
ALL 6 ENGINES USE

DIAMOND ROLLER CHAINS

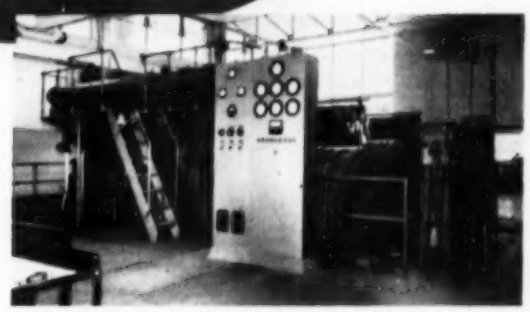
FOR TIMING OR ACCESSORY DRIVES!

Winner of the Diesel Progress award for the second consecutive year!

The Johnson plant of the Wolverine Electric Cooperative at Hersey, Michigan, winner of the Diesel Progress award for the most efficiently operated of all REA internal combustion plants.



The three big Fairbanks-Morse Model 31AD18 2 cycle Dual Fuel engines are rated 3500 hp. each at 277 rpm. Diamond Roller Chain, from crankshaft up and bending to one side over a pair of idlers, operates the camshaft which actuates the gas valves. The camshaft is 71" above and 45 23/64" to the right of the crankshaft. Diamond Roller Chain #433 (¾" pitch double strand 276 pitches long) is used. Crankshaft and camshaft sprockets have 37 teeth each; idlers, 22 teeth.



Diamond Roller Chains drive the fuel pumps on these three Cooper-Bessemer Dual Fuel engines. Model LS-8GPT 4 cycle, 1650 hp. engine uses 116 pitches of Diamond #472 single strand chain from a 48 tooth camshaft sprocket to a 24 tooth pump sprocket. The two Model JS-8-T 4 cycle engines use 118 pitches of Diamond #434 quad roller chain from the 40 tooth crankshaft sprockets to 32 tooth jackshaft sprockets.

Diamond Roller Chains have been used by leading engine manufacturers for over a quarter century on all types of engines: gas, gasoline, diesel and dual fuel up to 5000 hp. and at speeds up to 10,000 rpm. They have proved their superior efficiency, dependability and economy for timing drives, fuel pump drives and lube and water pump drives as well as for power take-off.

Diamond Roller Chains simplify drive mechanisms and maintain practically full efficiency for the long life of the drive. They are easily installed, light in weight and extremely versatile in application.

The Diamond Chain engineering staff is ready to give you immediate assistance and practical recommendations.

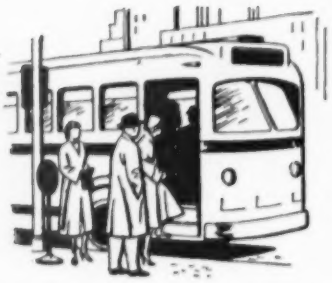
DIAMOND CHAIN COMPANY, Inc.
Where High Quality is Tradition
Dept. 407, 402 Kentucky Avenue
Indianapolis 7, Indiana

THESE DIAMOND FEATURES IMPROVE ENGINE EFFICIENCY

- Uniform highest quality
- Positive non-slip operation
- 98-99% efficiency
- Wide range of speed applications
- High power transmission capacity
- Adjustable to long or short shaft centers
- Long life dependability

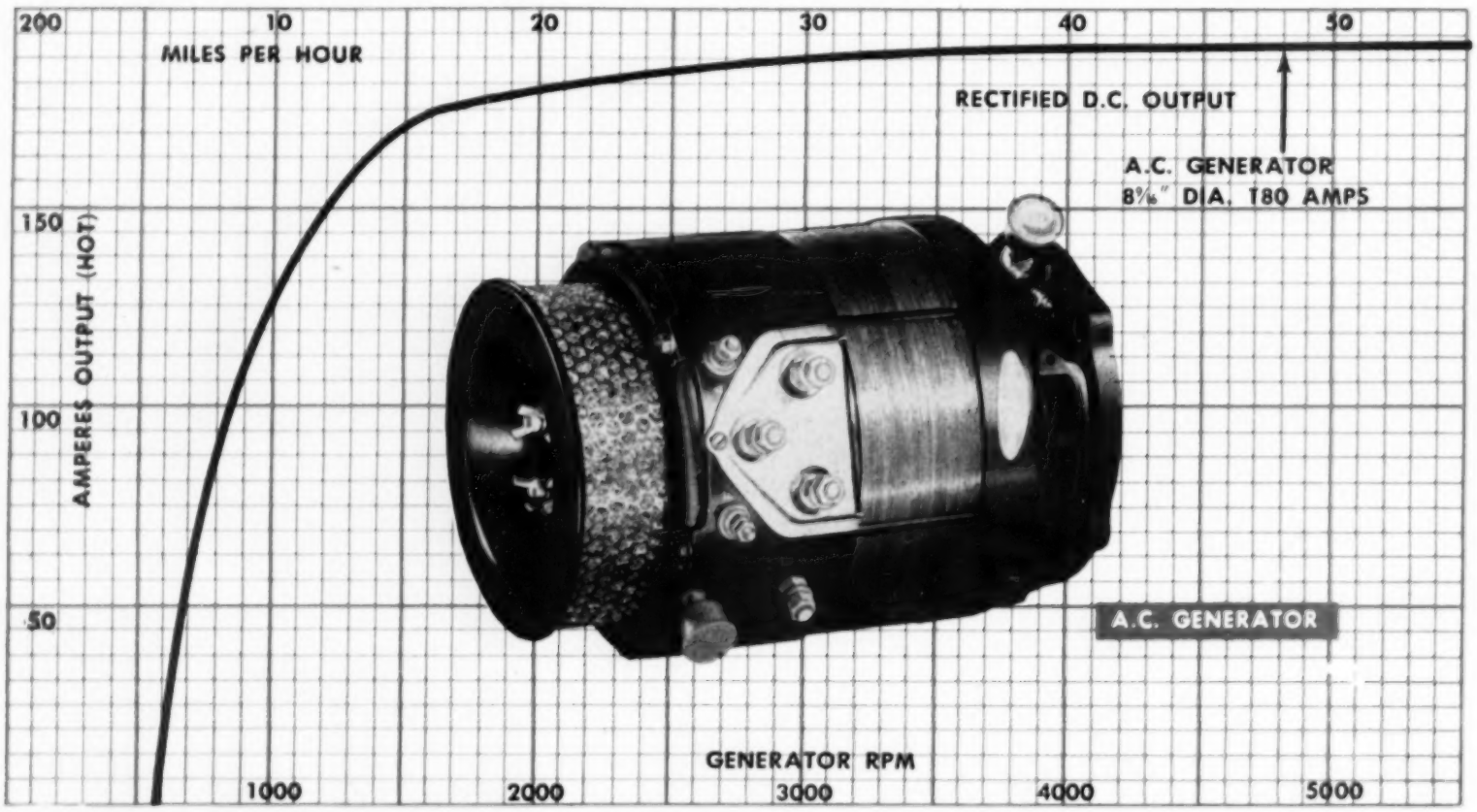
DIAMOND ROLLER CHAINS

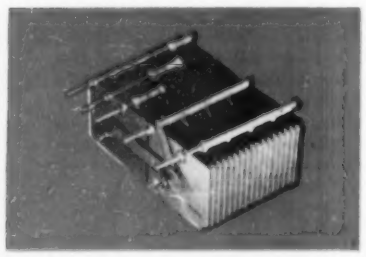
Power Packed and



DELCO-REMY A. C. GENERATOR

Heavy-Duty 180-Ampere Output Capacity





Rectifier

Regulator

The Delco-Remy A.C. generator is the heart of a 12-volt A.C.-D.C. electrical system designed specifically for modern buses with fluorescent lighting and extra-heavy electrical loads.

Desirable performance characteristics include cut-in at approximately 550 generator rpm . . . maximum output of 180 amperes at approximately 2000 rpm. The new generator supplies not only alternating current for fluorescent lights but also ample direct current for the heaviest electrical loads coupled with lengthy engine-at-idle periods.

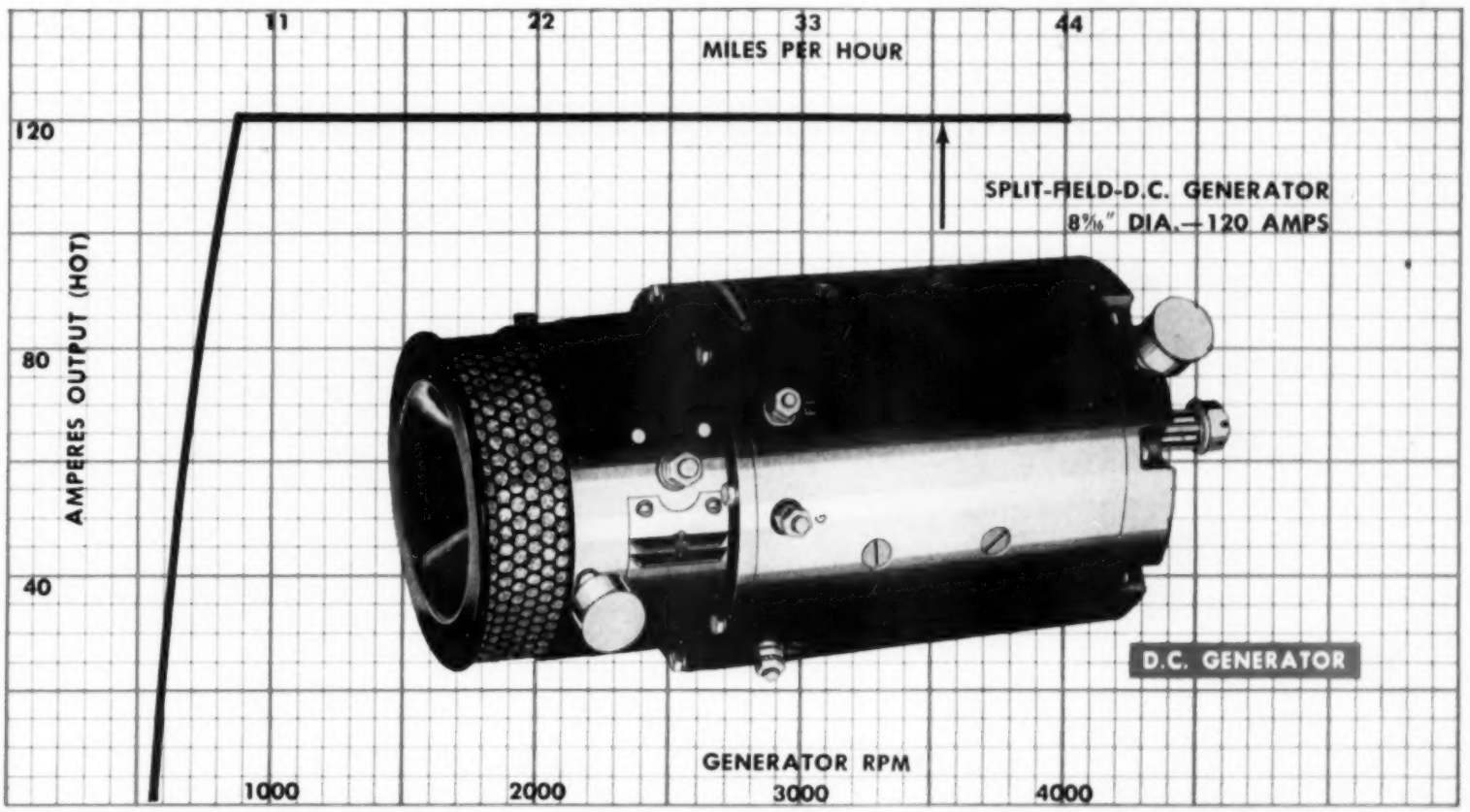
Impressive features of the new generator are its light weight, its very high output capacity, and its ability to operate over a wide speed range with greatest efficiency. Specify Delco-Remy electrical equipment on your new buses.

WHEREVER WHEELS TURN OR PROPELLERS SPIN

Right for the Job

DELCO-REMY D. C. SPLIT-FIELD GENERATOR

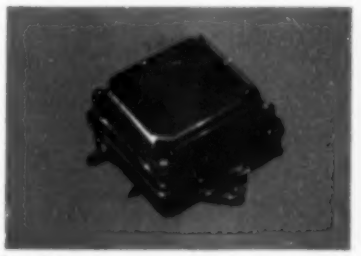
Heavy-Duty 120-Ampere Output Capacity



The Delco-Remy 12-volt split-field generator and its companion regulator are rugged and dependable—designed to meet the needs of transit buses having increased electrical loads coupled with a high percentage of engine idling time.

Desirable performance characteristics include low cut-in, high output at engine idle, and quick attainment of maximum output. Cut-in occurs at approximately 550 generator rpm; output reaches 70 amperes at approximately 700 rpm, maximum controlled output of 120 amperes above 850 rpm.

Operating benefits include reduced battery cycling, long battery life, and a simplified electrical system with sustained voltage—at no sacrifice in ruggedness or dependability. Specify Delco-Remy electrical equipment on all of your new buses.



Regulator

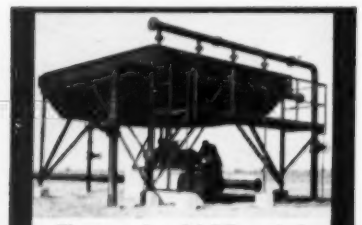
Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

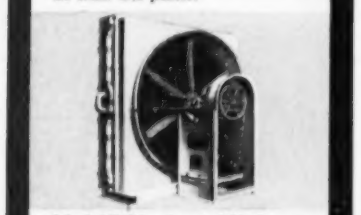
WHEREVER WHEELS TURN OR PROPELLERS SPIN

Now! Cut down on shutdowns with Trane Fluid Coolers!

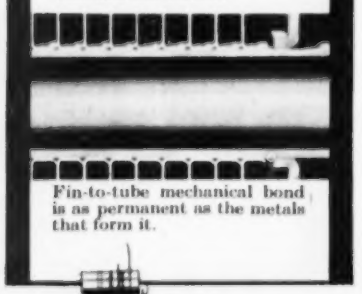
Lick vibration failure...reduce maintenance three ways



Close-up of model GC vertical discharge TRANE Fluid Cooler at Sun Oil plant.



Model EC horizontal discharge TRANE Fluid Cooler.



Fin-to-tube mechanical bond is as permanent as the metals that form it.

Downtime can be turned into operating time when you install TRANE Fluid Coolers, used by nation's leading oil and gas companies because they last longer, need less maintenance. Here's why . . .

Design protects coil from all vibration . . . Motor and balanced fan mounted *independently* of rest of unit. Fin and tube mechanically bonded for life. No solder to loosen—no thin radiator tank. Header *floats* in casing to reduce stress on tube-to-header rolled joint.

Maintenance downtime cut three ways . . . **1.** Removable header plate lets you get at tubes quickly. Round tubes easier to rod out. **2.** Single tube can be relined or plugged without removing entire core section. **3.** Plate type fins stay cleaner longer, are easier to clean.

No extra bracing needed . . . Rugged steel framework engineered to withstand wind and earth shock. Field assembly is simplified. Cooler operates as designed . . . the *first* time—*all* the time.

Automatic controls save power . . .Two-speed motor and automatic shutters over coil permit close control for maximum power savings.

Get all the facts today . . . Call your TRANE Sales Office or write TRANE, La Crosse, Wis., for Bulletin DS-395 containing capacities, performance curves, construction details, roughing-in dimensions, installation data and specifications.

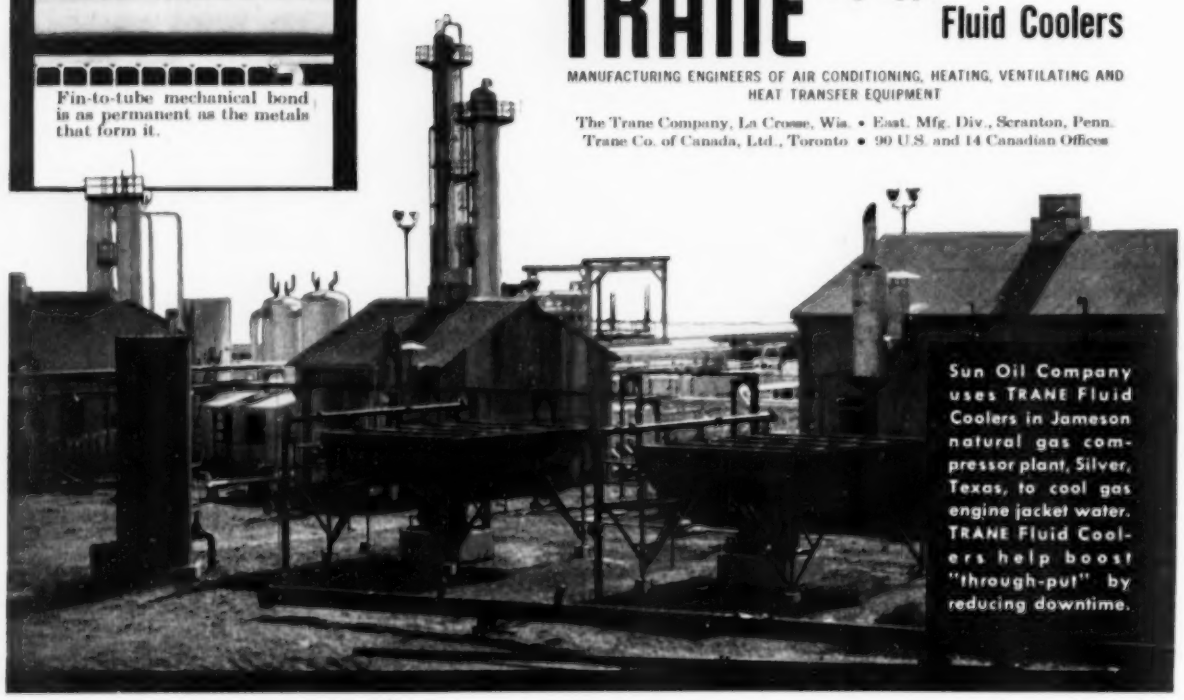
Typical users include Atlantic Refining Co.; Cooper Bessemer Corp.; Nordberg Mfg. Co.; Shell Oil Co., Refinery Division; Wolverine Pipe Line Co.

For lower operating cost . . . less downtime . . . specify

TRANE dry type **Fluid Coolers**

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

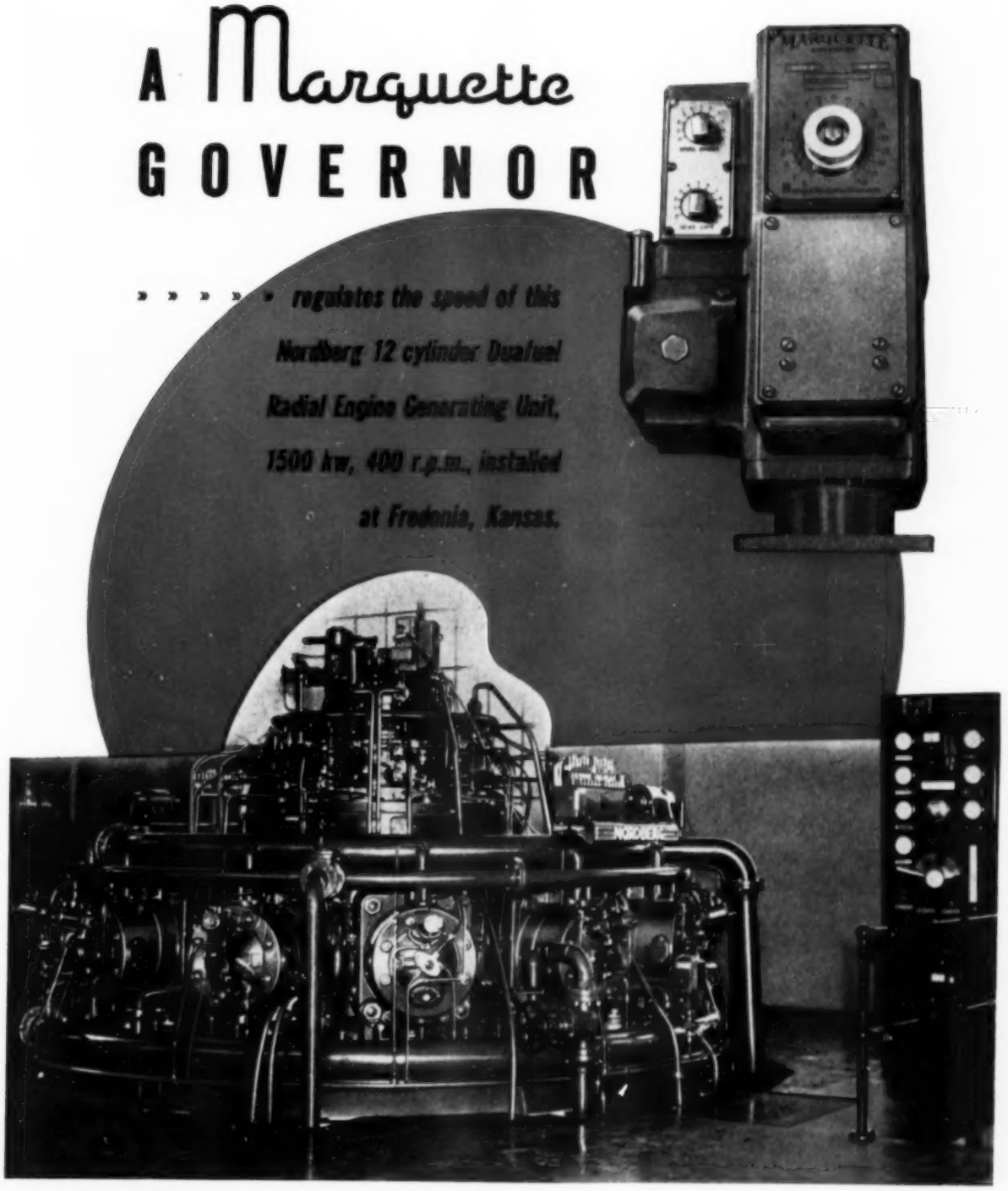
The Trane Company, La Crosse, Wis. • East. Mfg. Div., Scranton, Penn.
Trane Co. of Canada, Ltd., Toronto • 90 U.S. and 14 Canadian Offices



Sun Oil Company uses TRANE Fluid Coolers in Jameson natural gas compressor plant, Silver, Texas, to cool gas engine jacket water. TRANE Fluid Coolers help boost "through-put" by reducing downtime.

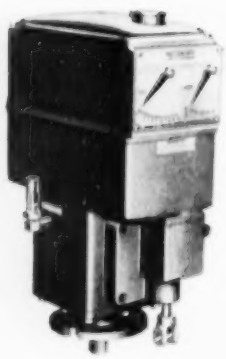
A Marquette GOVERNOR

» » » » » regulates the speed of this Nordberg 12 cylinder Dualfuel Radial Engine Generating Unit, 1500 kw, 400 r.p.m., installed at Fredonia, Kansas.



The Marquette METAL PRODUCTS CO.
CLEVELAND 10, OHIO
SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:
ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
ROTARY HIGH PRESSURE OIL FIELD PUMPING MACHINERY

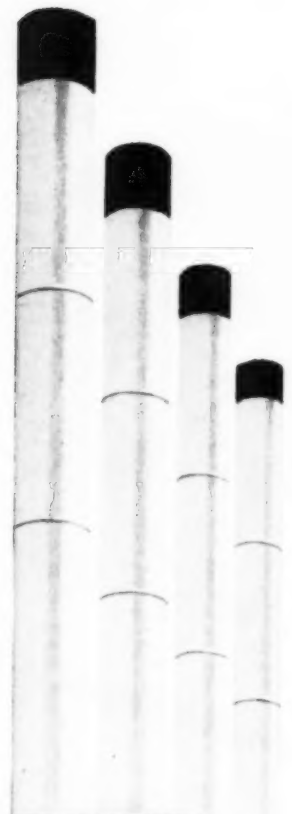


● Special tools, modern test equipment, and skilled mechanics are necessary for satisfactory repair of sensitive governor mechanisms. Our properly equipped service shop can supply you with a like new rebuilt governor on an exchange basis. Send us the serial number of your equipment for quick service.

WOODWARD GOVERNOR COMPANY

ROCKFORD, ILLINOIS

World's oldest and largest manufacturer of hydraulic governors for prime movers



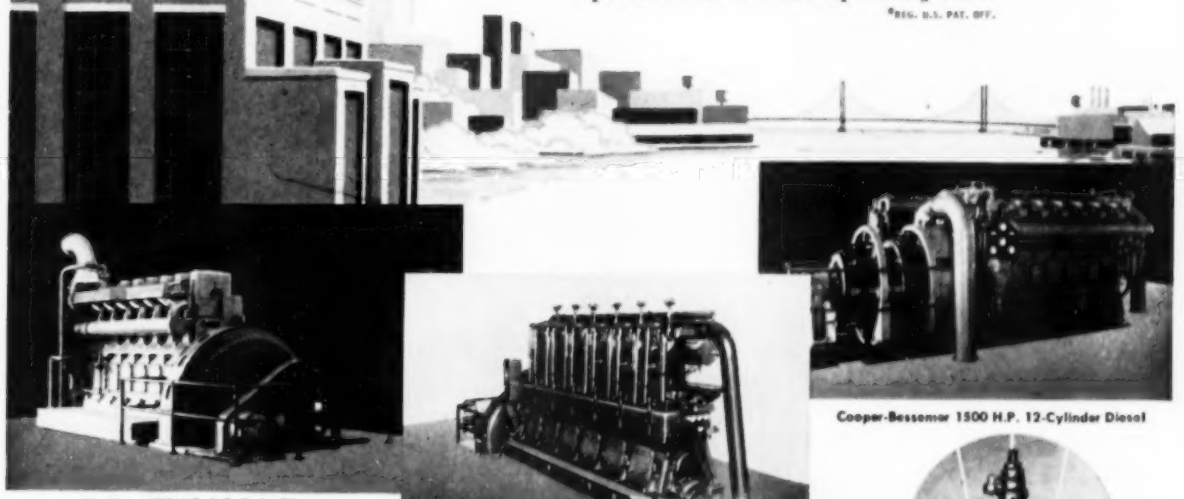
helping to generate a **power-full** "Municipal Story"

All over America powerful diesel engines are meeting the dual challenge of increasing load capacities and lowering the cost of power production for municipalities.

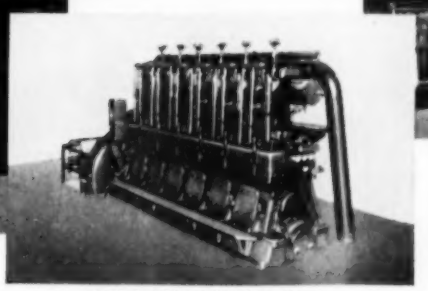
It is only natural that each year sees an increasing number of diesels in municipal use, for the economy of diesel operation has proved to be an important contribution toward reduced taxation and balanced city budgets.

It is also significant that more and more cost-conscious municipal operators are installing diesel power plants with Bendix* Fuel Injection because Bendix is long experienced in working with diesel manufacturers in achieving maximum performance with low operating costs.

*REG. U.S. PAT. OFF.



Nordberg 800 H.P. 6-Cylinder Diesel



Baldwin 750 H.P. 6-Cylinder Diesel

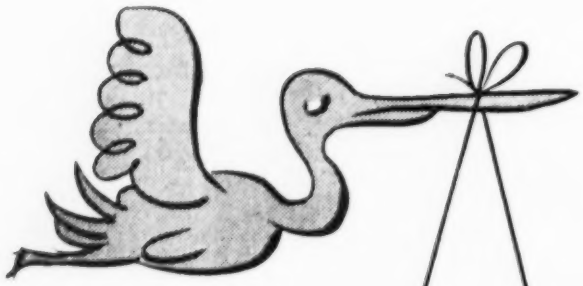
Cooper-Bessemer 1500 H.P. 12-Cylinder Diesel

SCINTILLA DIVISION of Bendix
AVIATION CORPORATION
SIDNEY, NEW YORK

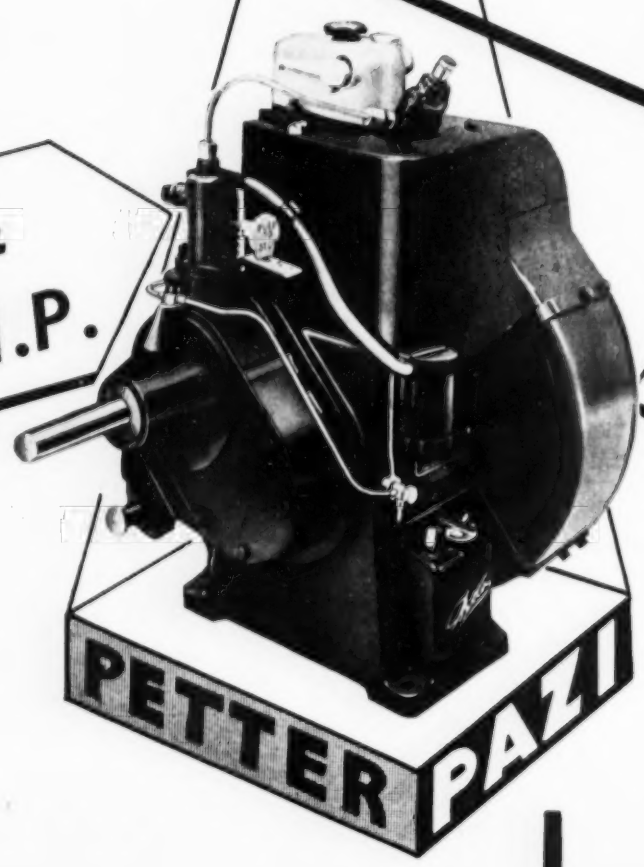
FUEL INJECTION EQUIPMENT

Western Office: 582 Market Street, San Francisco, Calif. • Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

A NEW ARRIVAL



To the Petter air-cooled diesel engine family



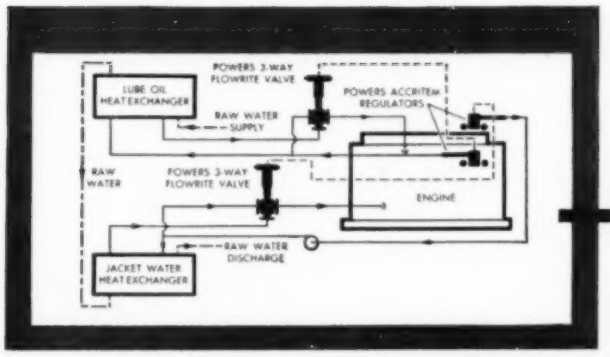
1½ & 2½ H.P.

Range NOW 1½ - 40 H.P.

BACKED BY A WORLD-WIDE PARTS AND SERVICE ORGANISATION FOR THE 360,000 ENGINES IN USE

WRITE FOR INFORMATION
A FEW CHOICE DISTRIBUTORSHIPS OPEN

THE PETTER SMALL ENGINE DIVISION OF BRUSH ABOE, INC.
Office and Showroom 60-07 39th AVE, WOODSIDE, NEW YORK



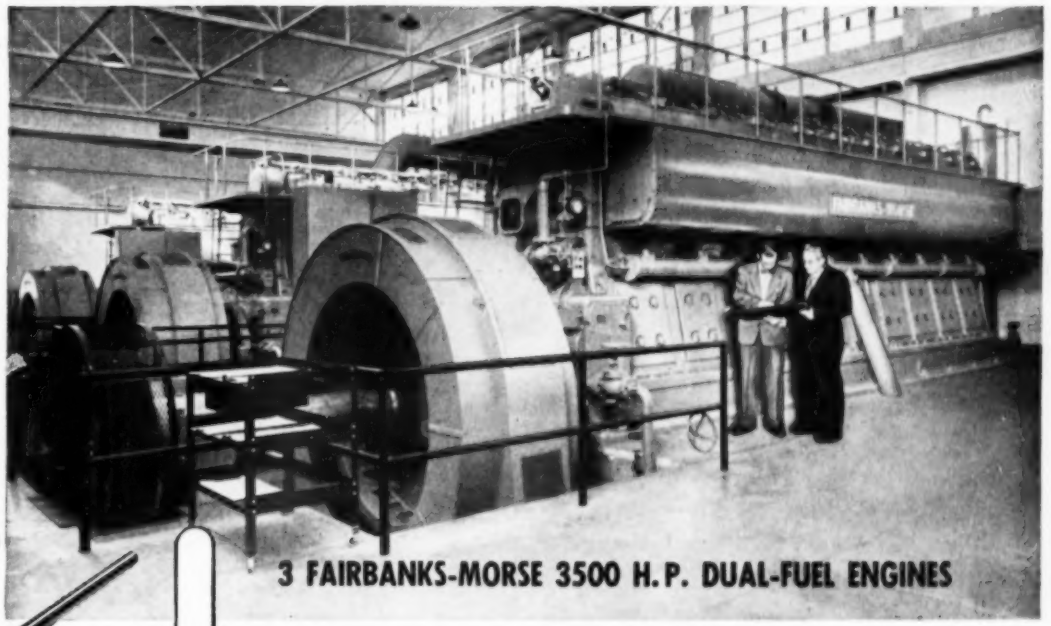
Right for the Job!

in the Hershey, Michigan Plant of

THE WOLVERINE ELECTRIC COOPERATIVE

Most Efficient REA Plant

Winner of Award for most economically operated REA station in 1952. Six engines helped earn this distinction: 3 Fairbanks-Morse 3500 hp. Dual-Fuel Engines and 3 Cooper-Bessemer Dual Fuel engines.
Consulting Engineers: J. & G. Daverman Co., Grand Rapids, Mich.



3 FAIRBANKS-MORSE 3500 H.P. DUAL-FUEL ENGINES

POWERS ACCRITEM REGULATOR below is compressed air or water operated

Compressed Air Supply

Six of these Regulators and six **FLOWRITE** valves control lube oil and jacket water used in the F-M engines above.

Temperature sensitive bulb of regulator is inserted in lube oil or jacket water line. Has easily adjusted temperature adjustment dial. Rugged construction withstands vibration and insures years of dependable service. Is unsurpassed for reliability and power to control diaphragm valves.

Left: POWERS 3-Way **FLOWRITE** Control Valve. Six 6" pipe size valves are used in the above installation. They have many superior features which make them especially suited for large engines.

POWERS Safeguards Engine Investment

with RIGHT Type of Temperature Control for LUBE OIL and JACKET WATER

For each engine or air compressor there is a "best temperature for the lube oil and cooling water". To insure that temperature at all times regardless of variations in load or seasonal changes in temperature of water supply, install Powers Thermostatic Regulators.

Powers Regulators have been time tested and proven reliable on many large and small installations. ACCRITEM Regulators and FLOWRITE Valves shown at left are unsurpassed for dependable control of large size valves. For smaller engines Powers No. 11 Self-Operating Regulators have been widely used for many years. Either of these controls can be applied to your present engines if they are not already protected.

For the Right type Control for Your Engines or Air Compressors— contact Powers nearest office or write us direct. (h63)

THE POWERS REGULATOR COMPANY

OFFICES IN OVER 50 CITIES IN U.S.A., CANADA, AND MEXICO • SEE YOUR PHONE BOOK

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL

we passed the word around

we had hundreds of diesel operators try it

we put it to a two-year test in our towboat and transport fleets

we tested it in many types of diesel engines

now it can be told!

Super HD Oil positively keeps engines clean

Extensive tests proved the superior performance of Ashland Super HD Oil before we started to market it. This oil will *do* all the things claimed for other detergent-type oil.

CLEANS OUT CRANKCASE SLUDGE

Motors troubled with dirty screens and clogged lines clear up when TOPFLITE is put into the crankcase. Contaminants are kept in suspension and drained out at the next oil change.

KEEPS RINGS CARBON-FREE

After many hours of operation in new and reconditioned engines, rings and valves were free of sticky deposits and pistons remained clear of varnish.

PROTECTS MOTORS AT ALL TEMPERATURES

Low rates of wear on engine parts and bearings were proved by tests in diesel and gasoline engines. High speeds — high temperatures — continuous or intermittent service make no difference to Ashland TOPFLITE Super HD Oil.

SAVES MONEY ON OVERHAULS

Time between overhauls was considerably lengthened in all our tests — in some cases actually doubled.

Try this new TOPFLITE Super HD — the oil with a proved performance record.

ASHLAND OIL & REFINING COMPANY

Home Office: Ashland, Kentucky

SUPPLY TERMINALS: Ashland, Ky. • Buffalo, N. Y. • Canton, O. • Cincinnati, O. • Cleveland, O. • Detroit, Mich. Erie, Pa. • Evansville, Ind. • Findlay, O. • Follansbee, W. Va. • Freedom, Pa. • Hartford, Ill. • Kenova, W. Va. Louisville, Ky. • Marietta, O. • Nashville, Tenn. • Niles, O. • Paducah, Ky. • Pittsburgh, Pa. • St. Elmo, Ill. • Toledo, O.

WOLVERINE CO-OPERATIVE WINS
ANNUAL DIESEL PROGRESS AWARD
FOR SECOND TIME

JOHNSON PLANT AT HERSEY, MICHIGAN ACCLAIMED MOST EFFICIENT

Johnson Plant at Hersey, Michigan, Acclaimed Most Efficient for Second Straight Year; Cooper-Bessemer and Fairbanks-Morse Engines Improve on Notable 1952 Record

By WM. H. GOTTLIEB

FOR the second successive year, the Wolverine Electric Cooperative's Johnson Plant at Hersey, Michigan, has been acclaimed as the most efficient REA internal combustion generating station in the nation. Winner in the second year of the national competition sponsored by DIESEL PROGRESS, the Michigan plant improved on its notable operating record of 1952 to take the honors again for top-ranking 1953 performance of its three Cooper-Bessemer and three Fairbanks-Morse dual-fuel engines.

The award is given to the plant which produces a kilowatt-hour most economically and, to insure that this cost reflects operating efficiency rather than availability of cheap fuel, the cost of fuel for all plants is equalized at 50 cents per 1,000,000 Btu. The plants are selected by the Rural Electrification Administration on the basis of official operating reports submitted to Washington by all REA co-operatives. After adjustment of fuel price, the plant which achieved the lowest operating cost per kilowatt-hour is certified as the winner and is awarded a bronze plaque by DIESEL PROGRESS.

TABLE I — OPERATING DATA
JOHNSON PLANT, 1953

	Eng. #1 1010-hp.	Eng. #2 1010-hp.	Eng. #3 1650-hp.	Eng. #4 3500-hp.	Eng. #5 3500-hp.	Eng. #6 3500-hp.	Total Plant
Kwh. Gen.	997,810	775,760	2,858,380	10,592,400	11,948,600	12,872,600	40,045,550
MCF Gas	8,978.2	7,061.2	23,928.4	94,374.6	104,719.6	111,829.25	350,891
Gal. Fuel Oil	8,029	6,444	22,984	65,739	66,807	71,219	241,222
Cu. Ft. Gas/Kwh.	8.99	9.10	8.37	8.91	8.76	8.69	8.76
Gal. Oil/Kwh.	.00804	.00830	.00804	.00620	.00559	.00553	.00602
Btu./Kwh.	9,852	9,995	9,249	9,519	9,289	9,213	9,348
Fuel Cost Mils/Kwh.	4.03	4.10	3.81	3.82	3.71	3.68	3.75
Eng. Hours	2,098	1,522	3,590	6,068	6,310	6,947	

Wolverine is a power cooperative, supplying electricity to three distribution co-ops — Tri-County Electric Cooperative of Portland, Mich., the O & A Electric Cooperative at Newaygo, Mich., and the Oceana Electric Cooperative of Hart, Mich. The area served is nearly a third of the State of Michigan and some 17,000 members and a few bulk power customers combined to purchase 52,407,037 kw. hrs. in the year 1953. Peak load went as high as 12,942 kw. To meet this demand, Wolverine operated five generating stations with 22 diesel and dual-fuel engines producing a net total of 49,646,628 kw. hrs. and purchased an additional 5,180,875 kw. hrs. The largest supply of economical natural gas was available at Hersey and there the cooperative developed the Johnson plant as the base load

The Board of Directors of Wolverine Electric Cooperative, Big Rapids, Michigan. From left to right: Glen Chase; John N. Keen, Manager; Carl Johnson, President; I. E. Royer; Eugene TenBrink; Harry Burmeister, Vice President; Leonard Balgoyen, Secretary.

Below: **Chief operating officers of Wolverine Electric Cooperative in conference. Left to right are Manager John N. Keen, Office Manager Donna Brown, and Superintendent of Transmission S. Donald King.**

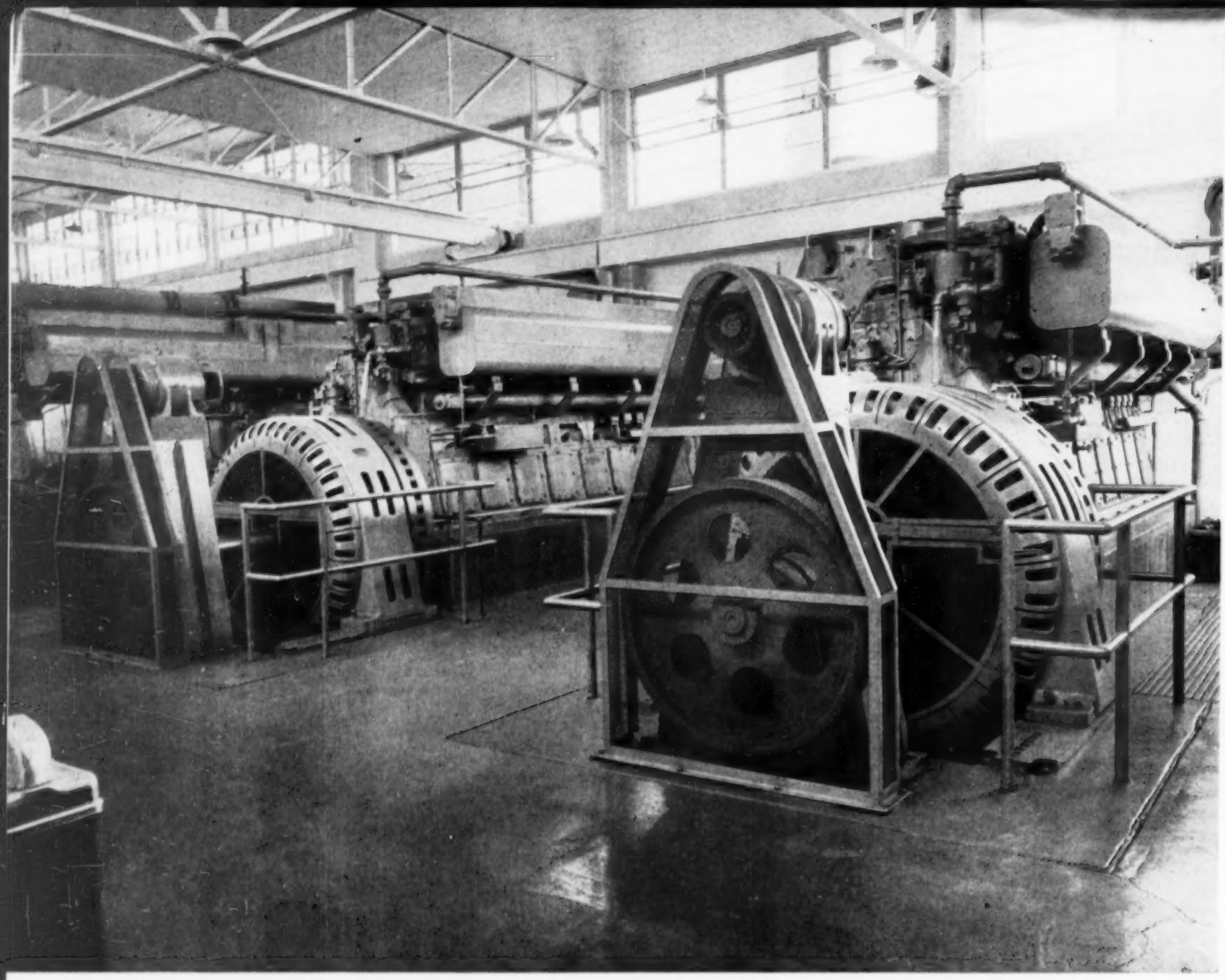
station of the system. In 1953, this one plant recorded a net generation of 38,936,177 kw. hrs., more than 78 percent of the five-plant total.

The original plant, constructed by O & A Co-op., consisted of three supercharged, four-cycle Cooper-Bessemer diesels, two 1,010 hp., 400 rpm. units installed in 1946 and operated as dual-fuel engines since 1948, and a 1,650 hp., 327 rpm. dual-fuel unit installed in 1949. It was in 1949 that Wolverine was formed and the decision made to develop the Johnson plant as the key station in an integrated system. Pursuant to that decision, the Co-op installed three identical Fairbanks-Morse two-cycle, dual-fuel engines, each rated at 3,500 hp. at 277 rpm. The first of these big units went on the line in October 1951, the second in December of the same year and the third in February 1952. The 1953 efficiency record at Hersey was a double achievement. Not only was it good enough to make this the best REA plant of the year, but it outstripped in every respect the plant's own 1952 record which was then the best in the nation. We shall examine the operating figures and look into equipment and operating methods for a few clues to the plant's success.

In generating a gross total of 40,045,550 kw. hrs. in 1953, the dual-fuel engines consumed 350,891,000 cu. ft. of natural gas and 241,222 gal. of pilot oil, an average of 8.76 cu. ft. of gas and 0.00602 gal. of fuel oil per kw. hr. Figuring the gas at a heating value of 972 Btu. per cu. ft. and the oil at 138,532 Btu. per gal., this fuel consumption amounts to an efficient 9,348 Btu. per kw. hr. The previous year, the average was 9.00 cu. ft. of gas and 0.0077 gal. of oil, or 9,815 Btu. per kw. hr. All six engines in the plant improved their performance in 1953. The big No. 6 unit took over from No. 5 as top volume producer and efficiency leader, generating 12,872,600 kw. hr. while consuming 111,829,250 cu. ft. of gas and 71,219 gal. of pilot fuel. This represented an average of just 8.69 cu. ft. of gas and 0.00553 gal. of oil per kw. hr., a scant 9,213 Btu. It should be noted that this efficiency was achieved at slightly less than three-quarter load. Complete 1953 figures on generation and fuel consumption of each of the six engines are given in Table I.

Fuel economy is a major factor but, of course, not the sole determinant in the cost per kw. hr. on which Johnson Plant's superiority was judged. With fuel oil at 10 cents a gal. and natural gas at 36 cents per mcf. the total production expense (including operation, supervision, engineering, sta-

Operating personnel at the Hersey plant, left to right: front row: Roy Ritzman, operator; Germaine Lockwood, chief operator; Vernon Mitchell operator. Back row: Kenneth Finkbeiner, apprentice operator; Elwood Mitchell, operator; Delbert Roggow, maintenance operator; and James Gillett, operator.



The three orignal Cooper-Bessemers in the Johnson Plant of Wolverine Electric Cooperative at Hersey, Michigan.

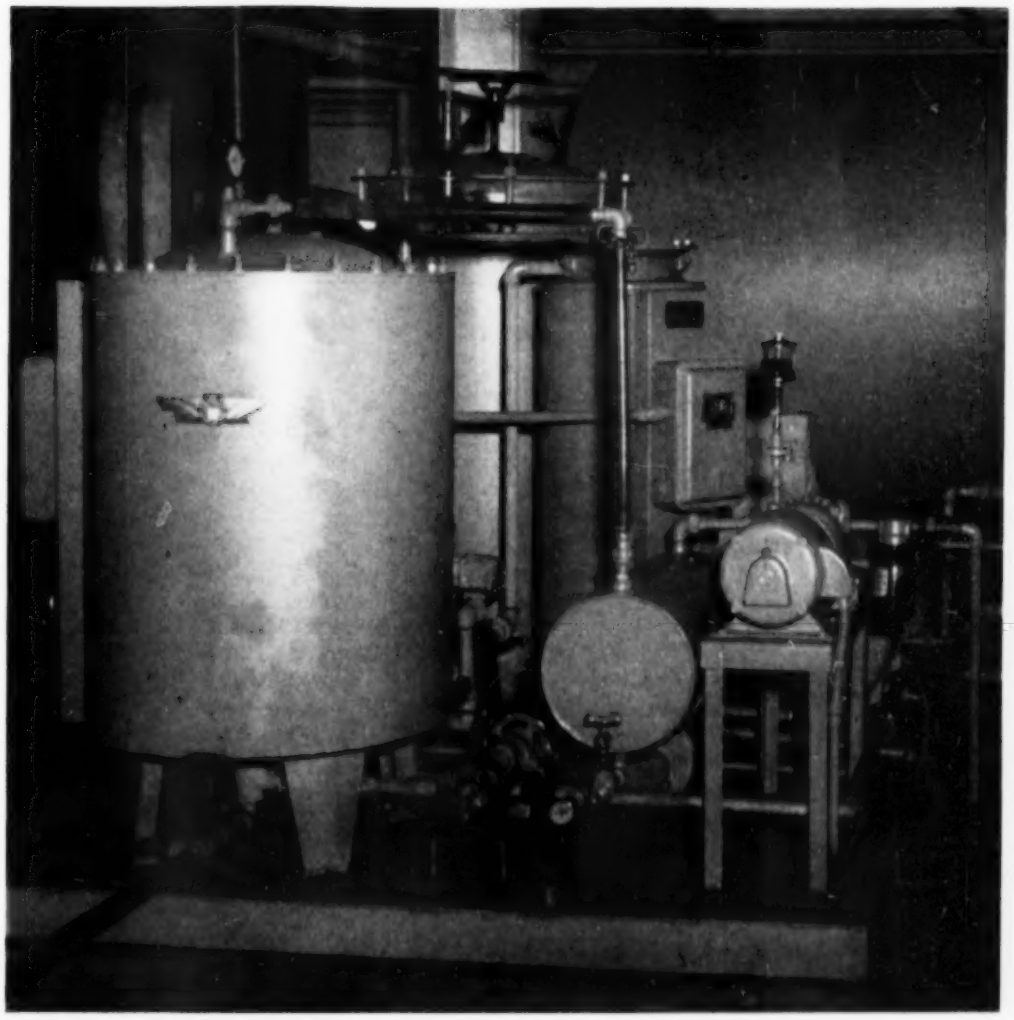
tion labor, fuel oil, fuel gas, lubricating oil, maintenance, supplies and miscellaneous operating costs) for the year 1953 amounted to $205,944.83. With net generation of 38,936,177 kw. hrs., this meant an average of 5.29 mills per net kw. hr. The corresponding figure in 1952 was 5.96 mills. Such overhead costs as depreciation, taxes, interest, insurance, and other administrative and general expenses came to a total of $129,373.66 or 3.32 mills in 1953, bringing total expense per net kw. hr. to 8.61 mills. This compares with 9.55 mills the previous year. Detailed cost figures are given in Table II. It should be noted that the fuel costs cited are actual costs and have not been altered in accordance with the contest equalization formula.

The reduction in unit cost reflects both the larger production volume and improved operating efficiency. There is constant attention to engine load factor. The three 3,500 hp. units serve as base load prime movers for the entire system, as indicated by the fact that they ran a combined total of 19,325 engine hours in 1953 at an average load factor of about 73 percent, producing a gross total of 35,416,300 kw. hrs. Other plants in the system and the three smaller units at Hersey are used to handle peaks and to pick up partial loads for the big engines. In handling a slow-rising load as in the Summer months, load is picked up on one of the Cooper-Bessemer engines until it is near capacity. Then one of the big units is started and the load is switched over, providing an initial load of about 50 percent. The big unit then takes on additional load until fully loaded when a Cooper-Bessemer engine is started up again and the process repeated. The same procedure is used in periods of declining load. In the Winter months, when load rises rapidly, a big engine is started, taking over part of the load from other units in operation, and is immediately available to handle the load as it develops. It is interesting to note that the operators have been able to maintain a good average load factor on the three Cooper-Bessemer engines in spite of their use for peaking and picking up load. In 1953, the three Cooper-Bessemer dual-fuel units operated at average load factors ranging from 68 to 73 percent.

Another factor which has helped promote economy is the ability of all engines in the plant to operate efficiently at partial loads. In tests conducted by J. & G. Daverman Co., consulting engineers, in August 1953, the three big two-cycle dual-fuel engines showed a relatively flat fuel consumption curve at loads from 50 percent to 110 percent. For example, the No. 6 engine (the efficiency leader of the plant), consumed 10,087.3 Btu. per kw. hr. at 50 percent load, 9,025.1 Btu. at 75 percent load, 8,830.3 Btu. at full load, and 8,900.5 Btu. at 10 percent overload. Care in fuel handling and maintenance of fuel injection equipment also has important effect on operating economy. For pilot oil, the plant uses a blend of 70 percent gas oil and 30 percent No. 3 diesel fuel, combined at the refinery. The oil is thoroughly filtered between storage and day tanks. The plant has a closed room equipped with nozzle tester and precision-type centerless grinder for maintenance of nozzles and injection pumps. Nozzles are replaced immediately if fuel consumption rises and every 30 days as a matter of routine preventive maintenance. All nozzles are tested and cleaned. Those that require it are dismantled for grinding and hand-lapping of the needle valve.

The only major equipment change at Hersey in 1953 came in July when air intercoolers were put into service on the three big F-M engines, just in

time for the hot months of the year. Scavenging air for these two-cycle engines is drawn through automatic self-cleaning filters into large air chambers that house motor-driven centrifugal blowers. From the blowers, the air goes through the intercoolers to the intake manifold. Cold raw water is taken from the inlet line to the jacket water heat exchanger by a motor-driven centrifugal pump and circulated through finned tubes in the intercooler. There is a separate circuit for each engine. Provision also is made for drawing warm raw water from the exchanger discharge line in case it is desirable to heat cold air in severe Winter weather. The effect of the intercoolers on scavenging air temperatures can be seen in records of engine tests conducted in August. With the No. 4 unit operating at full load and the intercooler in service, air intake temperature to the blower was 72°F., discharge from blower 102° to 109° and manifold temperature after the cooler 93°. The aftercooler was turned off and manifold temperatures rose to 109°. By insuring an adequate supply of engine air, the intercoolers make certain that the big dual-fuel



The Hoffman oil reclaimer at left is used for batch purification of lubricating oil, supplementing the individual filters for each engine. At right are Viking lube transfer pumps and in the background one of the lube storage tanks.

The original engines in the plant are these three Cooper-Bessemer dual-fuel units, one 1650 hp., Model LS-8-GDT and two 1010 hp. Model JS-8-T. All with Ideal generators. The Kirkhoff gauge board with Westinghouse gauges and Alnor pyrometer serves all three engines.

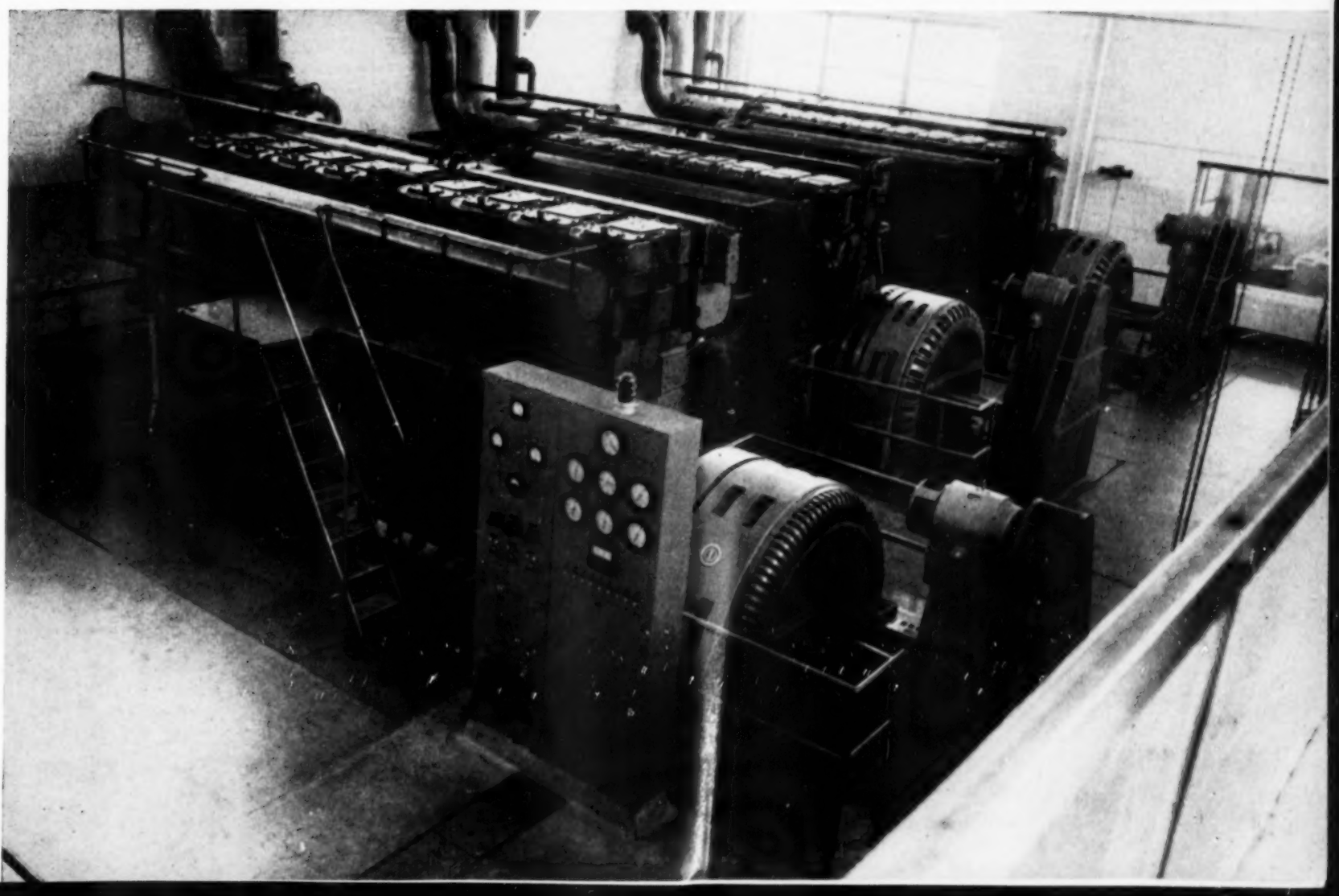


TABLE No. II — JOHNSON PLANT, 1953
COST COMPUTATION OF NET ENERGY GENERATED

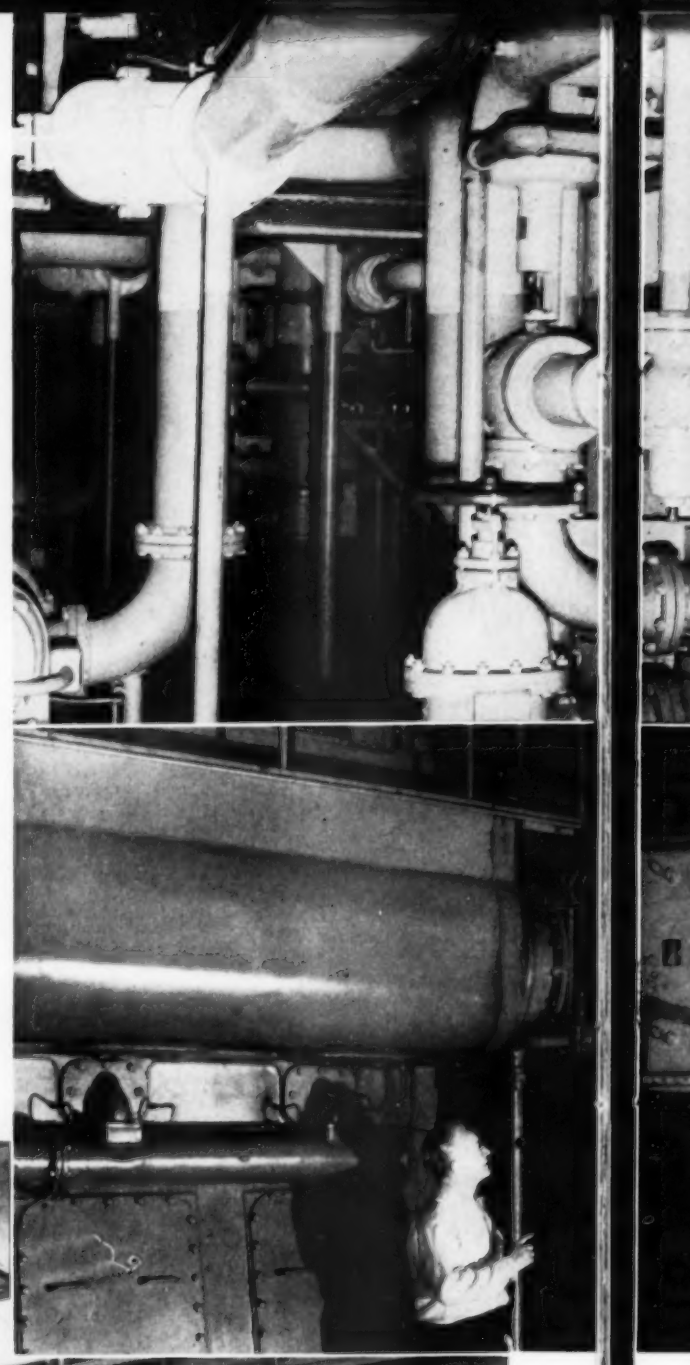
Expense Items	*Total Dollars*	*Mills per Kwh.*
Operation, Supervision & Engineering	$ 1,254.65	0.03
Station Labor	25,996.37	0.67
Fuel, Oil	24,183.78	0.62
Fuel, Gas	126,762.20	3.26
Lubricating Oil	14,054.85	0.36
Other Operating Expense & Supplies	2,539.04	0.06
Maintenance	11,153.94	0.29
Total Production Expense	$205,944.83	5.29
Overhead Costs		
Depreciation	$ 56,867.99	
Taxes	7,232.19	
Interest	41,672.22	
Insurance	2,661.46	
Other Admin. & General	20,959.80	
Total Overhead Costs	$129,393.66	3.32
Total Production Cost	$335,338.49	8.61

Each of the Fairbanks-Morse engines is served by a Ross heat exchanger and a Ross oil cooler, both equipped with Powers thermostatic valves. Also seen is the F-M water pump installed to serve the aftercooler. Below it is a magnetic filter in the lube line.

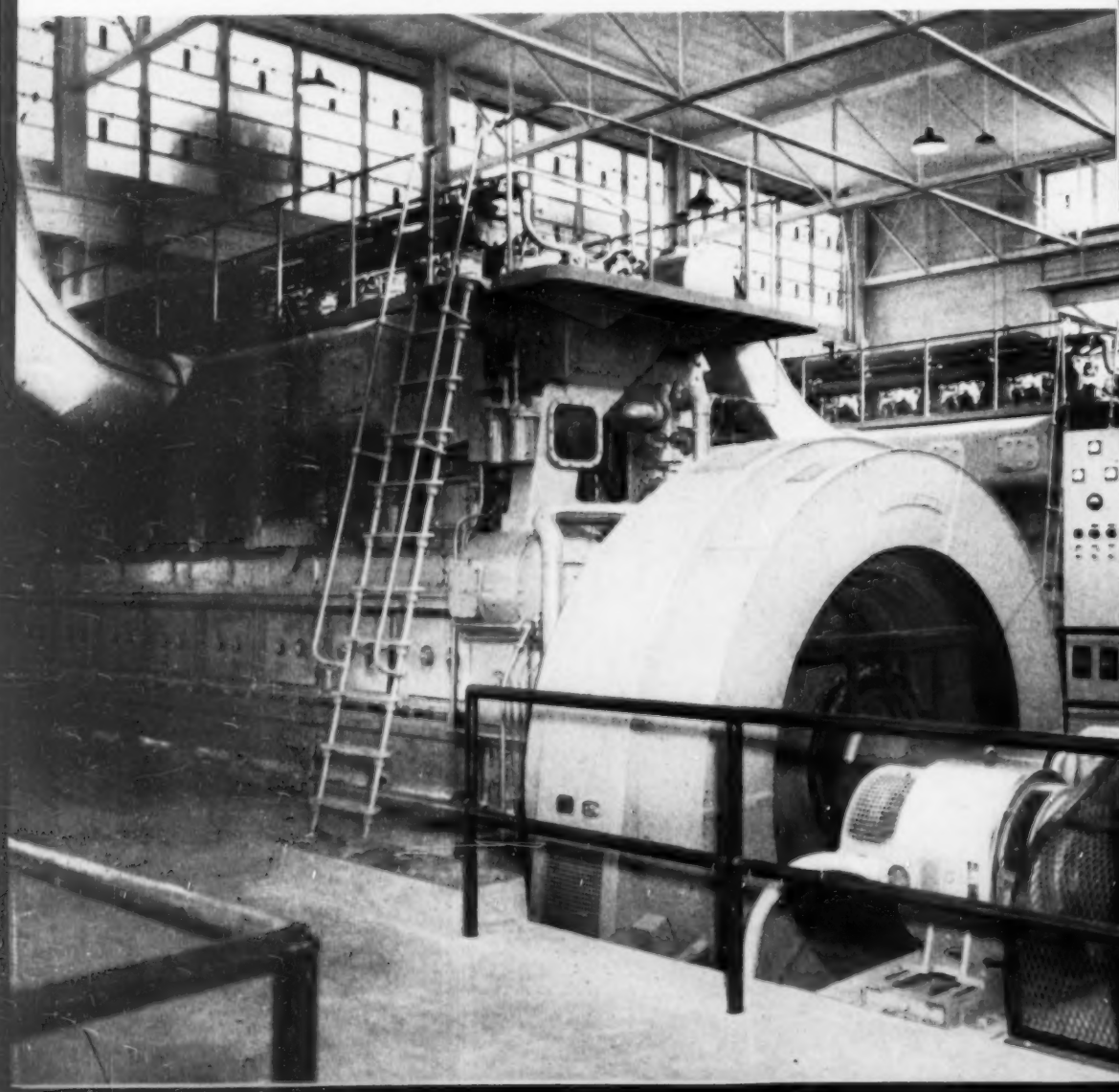
units can handle full loads and overloads in the hottest Summer weather. This allows the operators greater flexibility and results in better load factors. Initial experience with the coolers at Hersey indicates an improvement in engine efficiency.

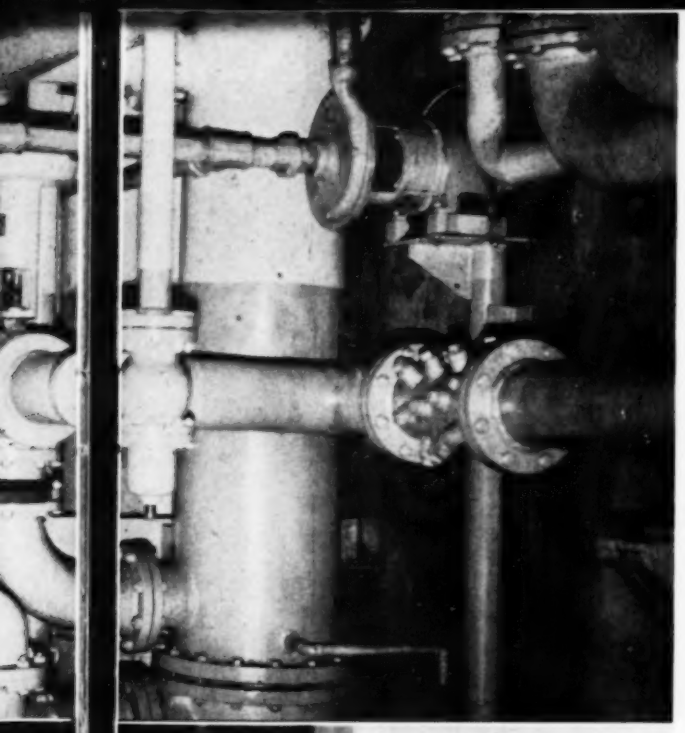
The care and precision of operations at Hersey is evident also in handling of lubricating oil. The detergent-type lubricating oil used throughout the plant is purchased in tank-car lots at a considerable saving and stored in two 4,000-gal. tanks. Lube oil is transferred by a motor-driven pump to a 2,000-gal. tank in the plant basement and then is pumped as necessary through individual meters to each engine sump. Every effort is made to maintain lube in perfect operating condition. Lube oil from each engine's pressure system is bypassed through an individual cellulose-packed filter and returned to the sump. Oil is tested regularly to detect contamination and dilution. In almost continuous operation is a reclaimer which has heating elements to drive off dilution and waste packed filters to remove contaminants. This has been so

Manager John N. Keen, left, and Chief Operator Lockwood, inspect Ross air coolers on one of the F-M engines. Scavenging air from motor driven blowers passes through intercoolers into the intake headers for the engines.



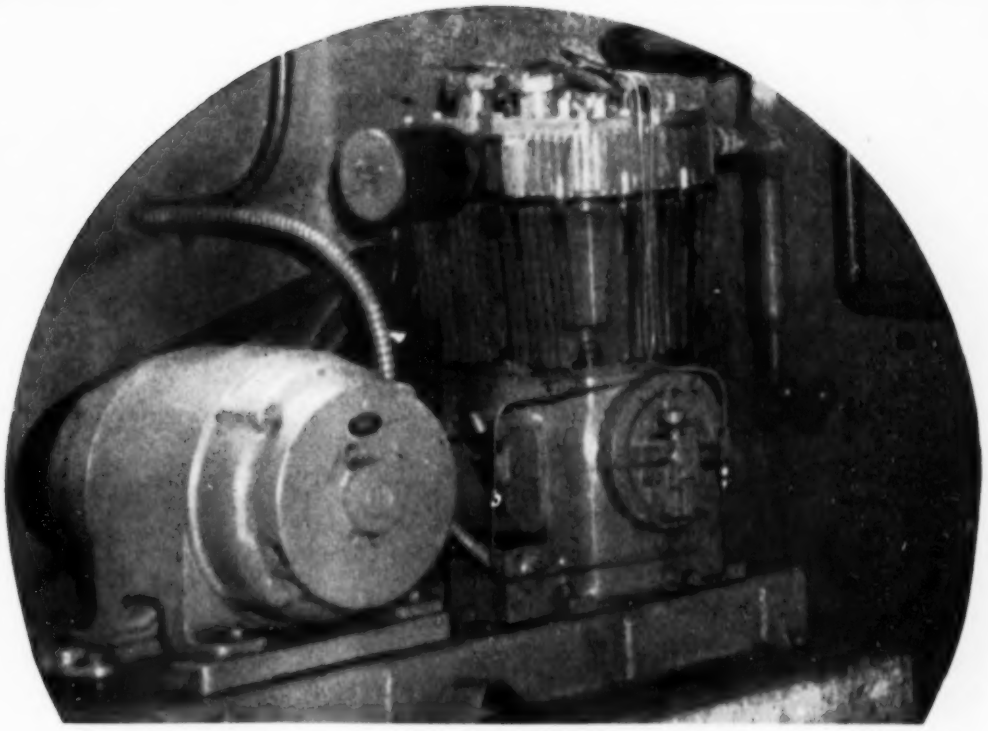
This view of the three 3500 hp. Fairbanks-Morse units shows the duplex Nugent fuel filters, the Madison-Kipp cylinder lubricators and two of the individual gauge boards.



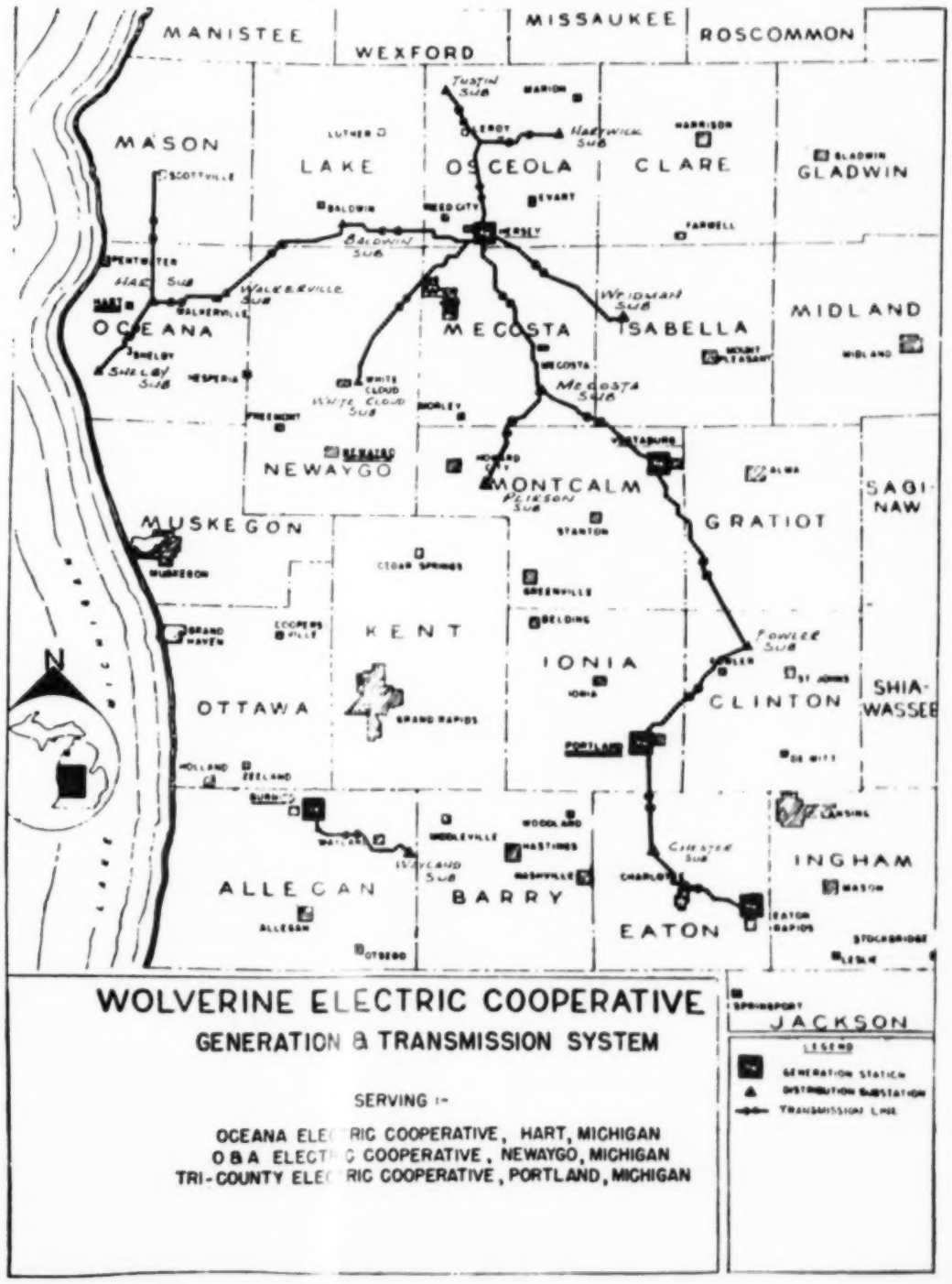


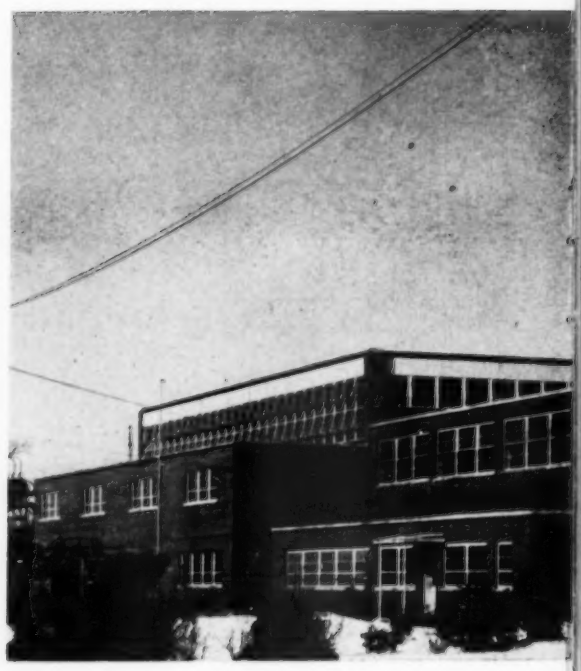
effective that it has extended the life of the primary lube filter cartridges to a full year. The reclaimer is reported by Co-op engineers to be particularly useful in removing moisture from the oil, thereby reducing sludge formation. The oil is kept at SAE 40 and some SAE 30 oil is added to replace light ends driven off in use and reclamation. The main lube circuits of the big engines include not only full-flow strainers but also magnetic filters to remove any metal particles that might get into the oil. Each engine has an oil cooler with thermostatic bypass valve to keep lube at prescribed temperature. Also, each unit has a motor-driven auxiliary lube pump for use in starting and shutting down the engine.

Jacket water for the original Cooper-Bessemer engines in the plant is cooled in radiators by motor-driven fans but the big engines make use of the inexhaustible raw water supply of the nearby Muskegon River. A pump house was constructed on the river bank to house three 750 gpm. centrifugal pumps driven by 25 hp. electric motors and one 400 gpm. centrifugal driven by a 15 hp. motor. Water is drawn from the river through a traveling screen and pumped to the heat exchangers and oil coolers at the plant, returning then to the river. Each engine has a motor-driven centrifugal pump



Largest and newest of the plant's three starting compressors is this motor driven Quincy unit.

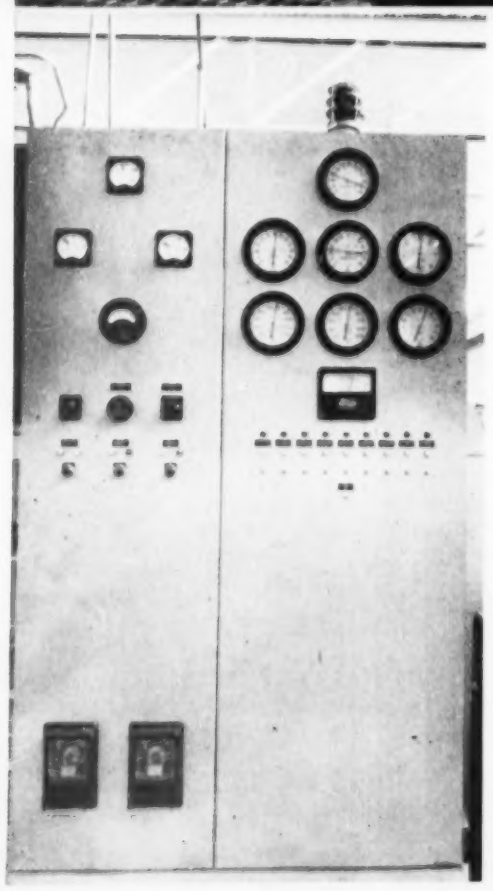




to circulate soft water through engine jackets and individual heat exchangers with thermostatically-controlled bypass valve. Makeup water is treated in softener before addition to the jacket supply.

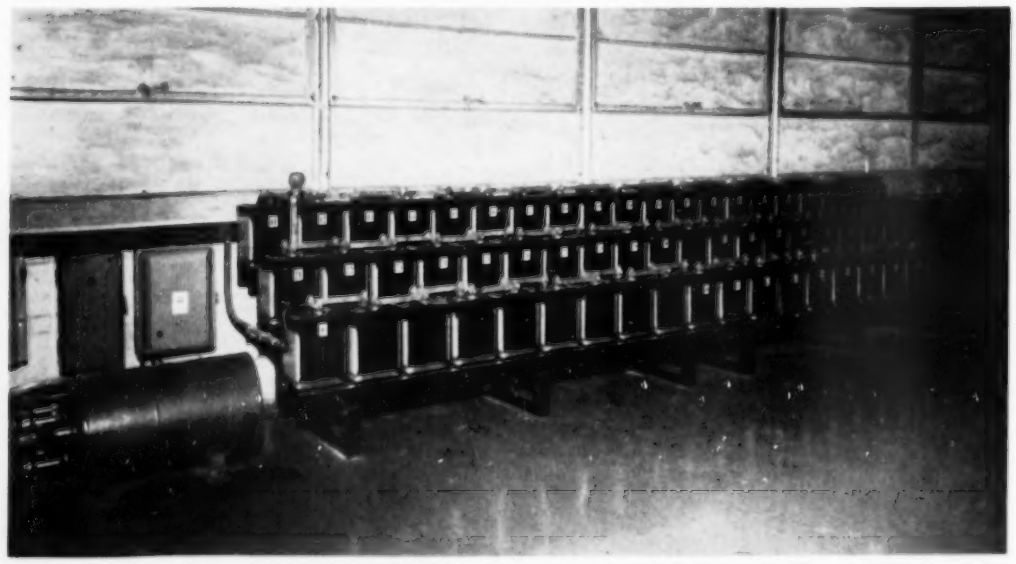
Maintenance of equipment at Hersey is a regular scheduled activity with a skilled maintenance operator in charge. In 1953, there was not a single enforced engine shutdown through engine failure. Scheduled maintenance averages just 300 hours a year for each engine which means that the units are available for service 96.5 percent of the time. If the engines were needed for longer service, the 300 hours could be cut substantially. The effects of sound management are often intangible but at Wolverine the effects are clear and substantial. Good load conditions and cheap fuel often can be influenced by management action. Manager John Keen literally worked years to negotiate bulk power sales that increased plant output without increasing peak loads. Mr. Keen and other Co-op executives encouraged a local refining company to develop two small gas fields, one at East Paris five miles from the Hersey plant and the other at West

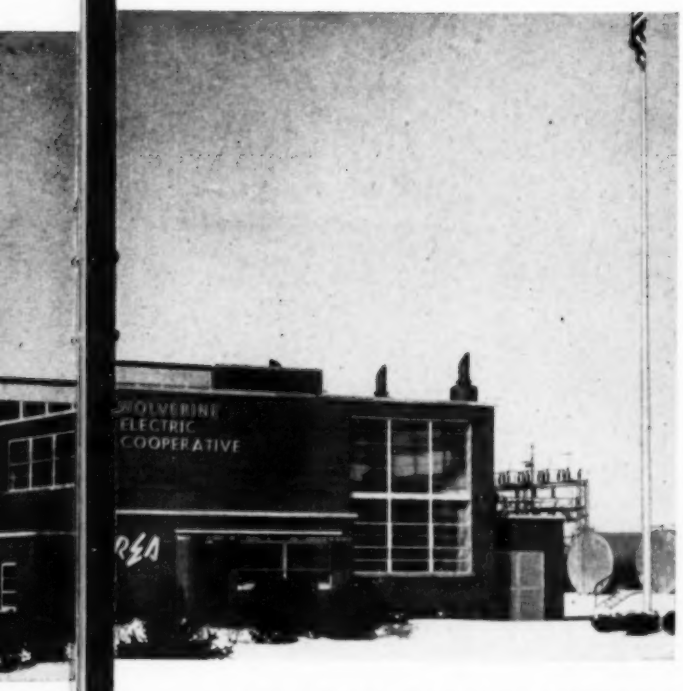
Maintenance operator, Delbert Roggow, services fuel injection nozzle needles on a Merlin Servicemaster.



Each of the 3500 hp. engines has a Kirkhoff gauge board which holds Westinghouse gauges, an Alnor pyrometer, a Liquidometer day tank level gauge and controls for accessory equipment including the accessory exciter.

The Exide "Manchex" battery provides current for emergency lighting and for electrically operated switchgear. The Westinghouse motor-generator set at left is used for battery charging.





Paris seven miles from the plant. Wolverine contracts for the total production of the fields and the plant's own line picks up the gas at the intersection of the gathering system of the six wells. Actually, Wolverine contracted for the output of the East Paris field before the wells were drilled.

Plant operating personnel are encouraged to be cost-conscious. Each chief operator gets a copy of the monthly operating and cost report for his plant and confers with the manager on means of effecting improvements. This concern with cost and efficiency is evident in the performance of Chief Operator Germaine Lockwood and his staff at Hersey. Progressive officers of the cooperative have given consistent support in the development and operation of this highly efficient power system. Wolverine is looking for continued growth and improvement in 1954. Mr. Keen expects system sales to reach 65,600,000 kw. hrs. and expects to add 10,000,000 kw. hrs. to Hersey production without raising peak loads. The result should be lower cost per kw. hr.

List of Equipment

Engines—Two 1010-hp., Model JS-8-T, dual-fuel engines. Cooper-Bessemer Corp. One 1650-hp., Model LS-8-GDT, dual-fuel engine. Cooper-Bessemer Corp. Three 10-cylinder, two-cycle, 3500-hp., Model 31AD18, dual-fuel engines of 18-in. bore and 27-in. stroke operating at 277 rpm. Fairbanks, Morse & Co.

Alternators—Three on F-M engines. Fairbanks, Morse & Co. Three on C-B engines. Ideal Electric & Mfg. Co.

Governors—Woodward.

Blowers—Roots-Connersville Blower.

Turbochargers—Elliott Buchi.

Chain drive on FM and CB—Diamond Chain.

Radiators—On 1010-hp. C-B. Young.

Motor-Generator sets—Fairbanks, Morse.

Air filters—On F-M engines. Continental Self-cleaning. On C-B engines. Air Maze.

Jacket water pumps—On F-M engines. Fairbanks, Morse & Co. On C-B. Allis-Chalmers.

Raw water pumps—Fairbanks, Morse.

Water softener—Bruner.

Raw water screen—Link Belt.

Thermostatic valve on jacket water—On F-M Powers.

Heat exchangers—On F-M, Kewanee-Ross Corp. On C-B, Alco.

Lube oil—Texaco Ursa Two Star. The Texas Co.

Cylinder lubricators—On F-M. Madison Kipp.

Aux. lube pump—On F-M. Blackmer Pump.

Lube screens—On F-M, Air Maze.

Lube by-pass filters—On F-M. U. S. Hoffman Machinery Corp.

Lube filters—On C-B. Cuno. Briggs Filtration Co. Hilco; The Hilliard Corp.

Lube reclaimer—U. S. Hoffman Machinery Corp.

Lube coolers—On F-M. Kewanee-Ross. On C-B. Kewanee-Ross. Alco Products.

Lube meters—On F-M. Buffalo.

Lube test kit—Gerin.

Lube transfer pumps—Viking.

Fuel oil—Oceola Refining Co.

Fuel transfer pumps—On F-M. Fairbanks, Morse. On C-B. Roper.

Intercoolers between blowers and engines—On F-M engines, Kewanee-Ross.

Piston rings—On F-M, C. Lee Cook. On C-B, Wilkening and American Hammered.

Fuel filters—On F-M. U. S. Hoffman Machinery Corp. Wm. W. Nugent Co.

Day tank level pump control—On F-M. General Controls.

Day tank level alarms—On F-M. Minneapolis-Honeywell.

Day tank level gauges—On F-M. Rochester Mfg. Co. Liquidometer Corp.

Fuel meters—Buffalo.

Gas regulators—McAlear and Fisher.

Gas valves—Luckenheimer.

Gas meters—On F-M, Roots-Connersville. On C-B, Emco. Rockwell.

Exhaust pyrometers—Alnor. Illinois Testing Lab.

Gauges—Westinghouse Electric.

Thermometers—On F-M. DPS.

Starting air compressors—On F-M. Quincy Compressor Co. On C-B. Ingersoll-Rand Co.

Exhaust snubbers—Burgess-Manning Co.

Crane—On F-M. Manning, Maxwell & Moore. On C-B. Shaw.

Switchboard—Kirkhoff Electric Co.

Switchboard instruments—Westinghouse Electric.

Battery—Exide.

Circuit breakers—Pacific.

Injection nozzle grinder—Merlin.

Nozzle tester—Fairbanks, Morse.

M-G set for battery charging—Electric Products Co.

Bearings—On F-M. Federal Mogul. On C-B. Cooper-Bessemer Corp.

Consulting engineers—J & G Daverman Co., Grand Rapids, Mich.

THE FIVE TOP REA PLANTS FOR 1953

Plant No.	Name of Plant	Size Kw.	Net M Kwh. Generated	Sta. Ser. %	Plant Factor %	R P C Factor %	Btu. per Kwh. Net	Hp/Hrs. Per Gal. Lube	Maint. Mat. $ Per Kw.	Production Expenses Mills per net Kwh. Labor	Fuel Adjusted to 50c per 10⁶ Btu.	Total	Make of Engines
1.	Hersey Plant Wolverine Elec. Coop. Big Rapids, Michigan	10,065	38,936.2	2.77	45.42	73	10,126	2,123	.43	.881	5.063	6.48	3—Cooper-Bessemer 3—Fairbanks-Morse
2.	Green Forest Plant M & A Elec. Power Coop. Poplar Bluff, Mo.	4,320	25,359.6	2.43	68.7	78	10,375	8,377	.53	1.301	5.050	6.80	4—Cooper-Bessemer
3.	Great Bend Plant Central Kansas Elec. Cooperative Great Bend, Kansas	9,404	34,941.5	4.17	44.26	83	10,100	8,160	.91	1.372	5.187	7.07	4—Worthington
4.	Benson Plant Western Minnesota Power Cooperative Benson, Minnesota	6,525	15,314.2	4.17	27.95	61	10,267	13,639	.43	1.643	5.134	7.36	6—Cooper-Bessemer
5.	Jackson Plant Federated Rural Electric Association Jackson, Minnesota	4,920	13,768.1	4.58	33.5	68	10,858	13,271	.55	1.812	5.430	7.66	4—Nordberg

IN the April, 1949 issue of DIESEL PROGRESS, it was our privilege to describe and illustrate the first Harnischfeger diesel which brought to our readers at that time how modern, powered equipment requires modern, improved engines; how research is an important, never-ending part of diesel engine manufacture; and why stress has been laid on developing diesel engines with lower pound per horsepower ratios and greater ease of maintenance along with a longer, economical life of fine lugging ability.

A GOOD DIESEL MADE BETTER

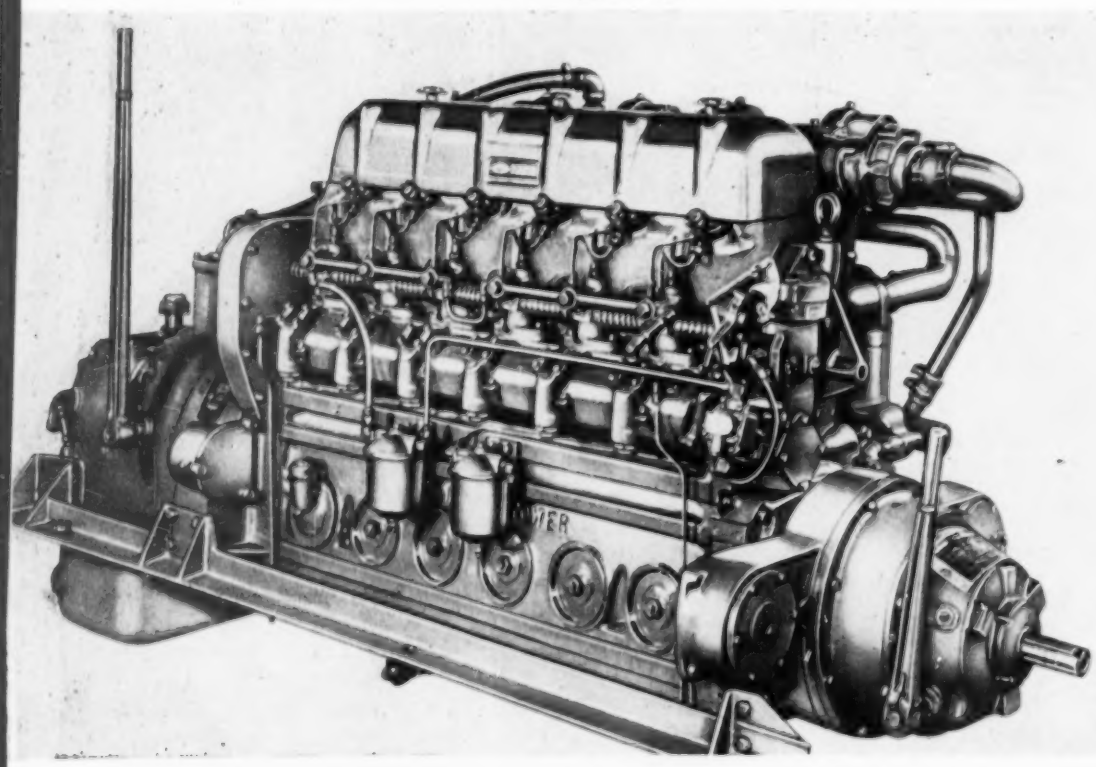
By BRUCE WADMAN

Now, P&H Diesel Engine Division, Harnischfeger Corporation, has quietly unveiled their improved Series C-18, 2-cycle diesels which develop 36% greater power output and feature 52 improvements in the new basic engine. These engines are rated by the manufacturer as the most powerful for their size and weight. Operating speed has been increased to 1800 rpm. Compression ratio on all models is 16 to 1. The bore and stroke are 4.5-in. by 5.5-in. The diesel has a displacement of 87 cubic inches per cylinder and is offered in 2-, 3-, 4- and 6-cylinder sizes having a horsepower range from 58 to 255. The weight is as low as 7.06 pounds per horsepower, thus meeting the constant demand for more power with lighter equipment.

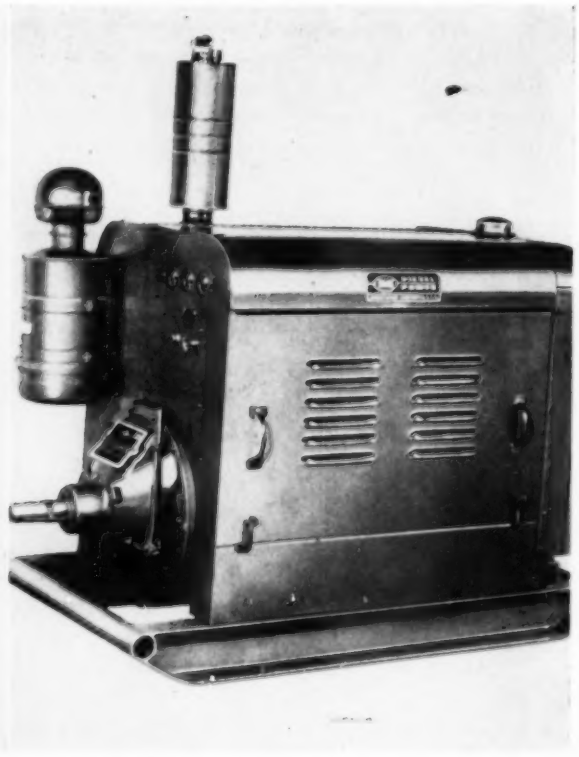
The most important change in the engine is the improved cylinder assembly. This has been completely redesigned for much improved efficiency and longer service. A more effective and complete scavenging has been achieved by a new valving arrangement and redesigned porting which imparts greater turbulence. This further adds to the performance. Increased power also results from the greater volume of fresh, cool air supplied to the cylinders by a new blower arrangement. With all these changes, the diesel retains the highly serviceable feature of making it possible to replace the complete cylinder head and liner assembly in a matter of thirty minutes without dropping the oil pan or moving the engine from its mounting. A complete change of the power assembly can be made overnight on any size engine, thus cutting time- and money-wasting downtime to an absolute bare minimum.

The cooling capacity of the new P&H diesel has been increased over former models through the enlargement of water passages and the addition of new channels in vital areas. The entire liner now receives uniform cooling. A special alloy cast iron used for the liners keeps vital surfaces "oil wet" at all times. The steel jackets, also new, are Parkerized for maximum corrosion resistance. These, like all the components in the redesigned liner assembly, can be replaced separately, anywhere. It is not necessary to drop the oil pan or to touch the engine mountings. This job is a 30-minute operation.

The P&H Harnischfeger Model 687C-18, 6-cylinder, marine engine having keel type cooling. This engine is also available in 2-, 3- and 4-cylinder sizes, covering the 35 to 255 horsepower range.



The Model 387C-18, a 3-cylinder enclosed type power unit. These are also available in 2-, 4- and 6-cylinder sizes.



The P&H diesel engine plant of Harnischfeger Corporation at Crystal Lake, Illinois.

Other major refinements include a new design of the combustion chamber for clean, thorough combustion. Pistons are now flat on top. Camshaft design has been improved for easier starting and more rpm. Injectors have been changed and now have a special tip which was developed by P&H. They provide a soft spray pattern with a single hole. A new exhaust manifolding provides considerably more effective carry-away.

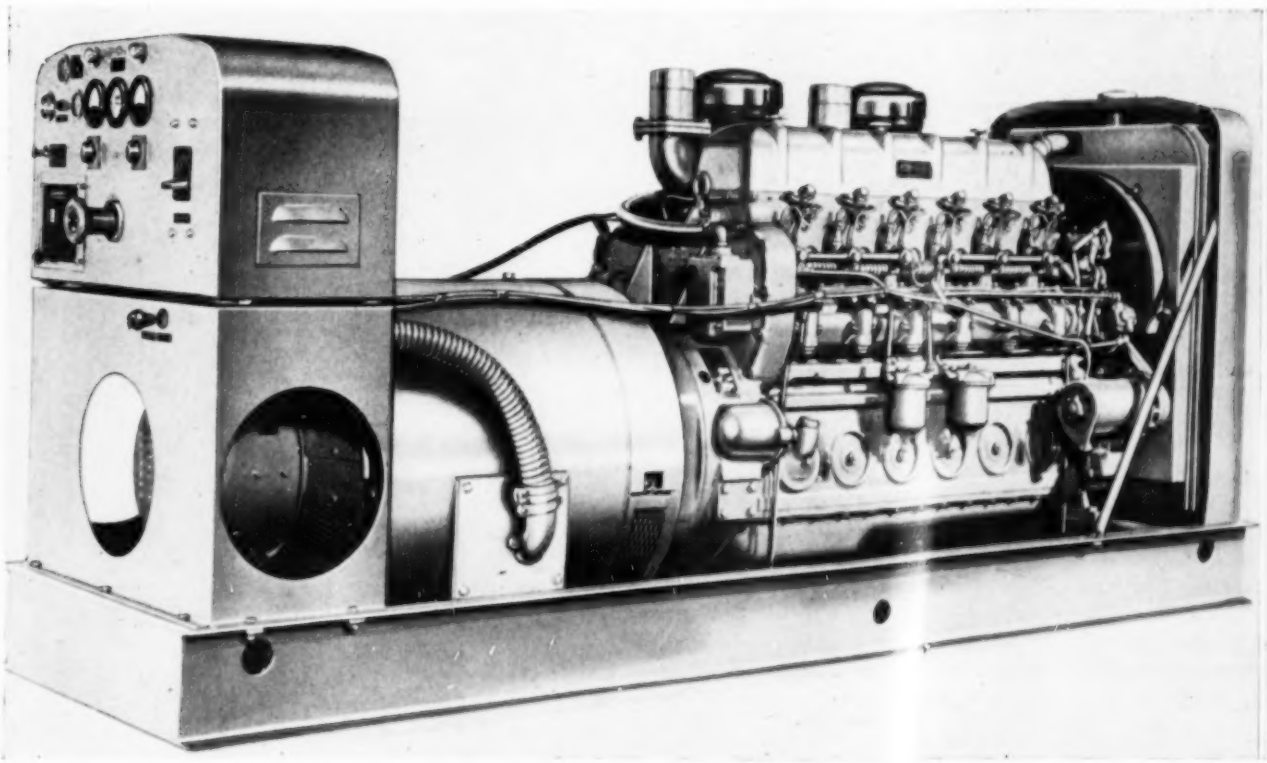
On marine applications, the P&H diesel is offered with the desired marine equipment. Offered are various gear ratios, heat exchanger, hydraulic or manual reverse gears, power takeoff and other desired accessories.

The principal equipment on the new line of P&H diesels consists of the following:

Scavenging blower—Schwitzer-Cummins.
Electric Starter—Auto-Lite.
Fuel transfer pump—John S. Barnes Corp.
Hydraulic governor—Woodward.
Fuel oil filter—Ful-Flo (Commercial Filters Corp.)
Generator—Auto-Lite.
Fuel injection equipment—Bendix-Scintilla and Demco.
Thermostat—Vernatherm (Detroit Controls).
Lube oil filter—Wix.
Pistons—Forgings by Alcoa and finishing by Ohio Piston.
Valves—Eaton stellite.
Bearings—McQuay-Norris.
Piston rings—Perfect Circle Corp.
Heat exchanger for cooling in the marine model—Harrison.
Radiators—Young.
Crankshafts—Muskegon Motor Specialties.
Camshafts—Universal Camshaft Co.

F. C. Edwards, General Manager (left) and D. E. Sweeney, Sales Manager of Harnischfeger, studying the improved cooling pasasges on the Model C-18 liner assembly.

The P&H diesel electric generator set, 75 kw., open type. These sets, utilizing the various Model C-18 sizes are available from 20 to 100 kw. both ac. and dc. for industrial and marine service.

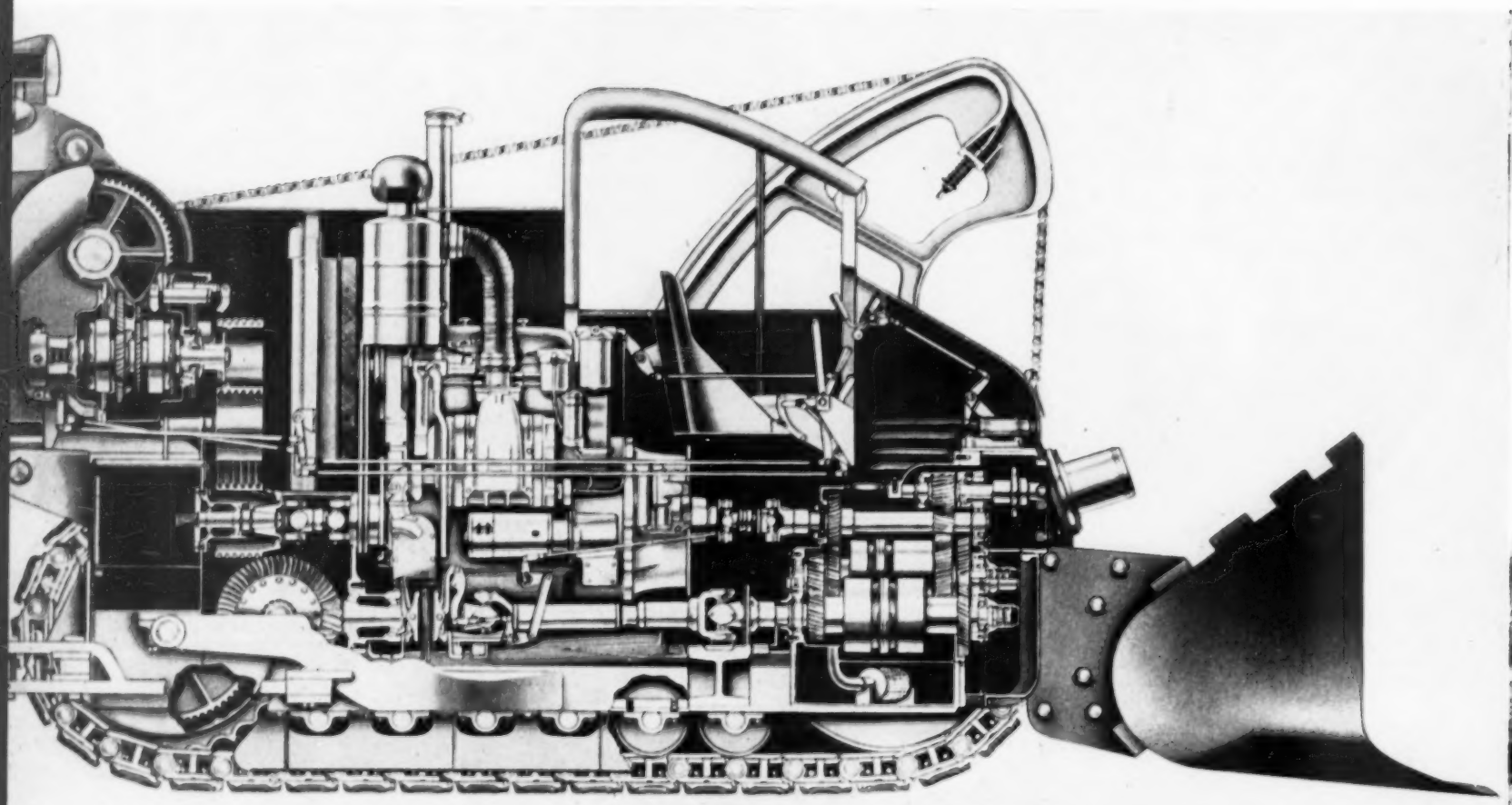


The Model C-18 head and liner assembly cross-section showing the improved cooling passages, new type intake ports and corrosion resistant water jackets.

CRAWLER TRACTOR FEATURES TORQUE CONVERTER

Transmission Eliminates All Foot Clutches and Manual Gear Shifting With Matched Engine Torque Converter Drive

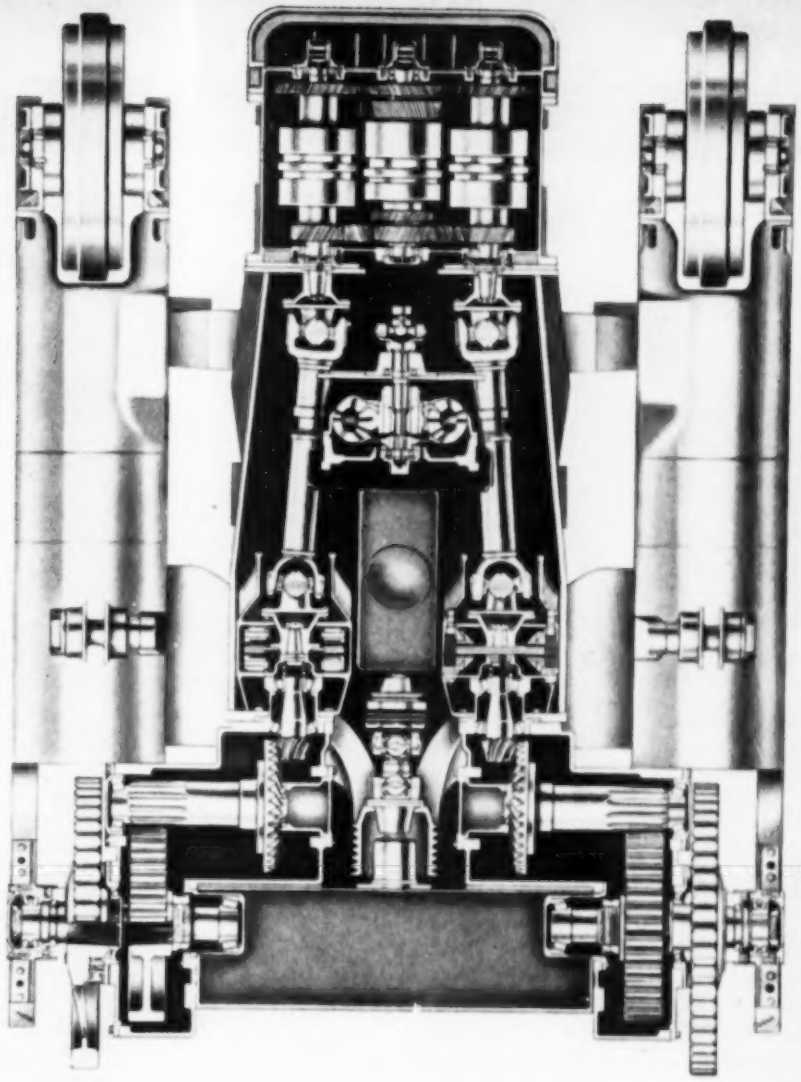
By DWIGHT ROBISON



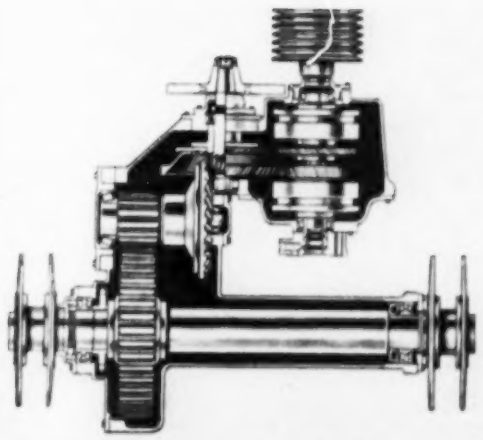
ENTERING into a new field of heavy machinery is the Eimco 105, which is basically a new heavy prime mover, available with its own excavating attachment and other tools. It is a considerably heavier model (weighs approximately 34,000 lbs. complete with loader) and has numerous design and operating improvements many of which are exclusive in this type equipment. The most important of these is the transmission, containing, in one compact unit, all of the gearing and clutches for speed changing and full independent reversal of each track. The design combines the best features of torque converter, constant mesh gearing and hydraulically actuated friction clutches with sealed oil bath, pressure lubrication of all wearing parts. The oil cooled, positive engagement clutches need no adjustment. The precision helical gearing is alloy steel, carefully heat-treated and micro-shaved. An important feature made possible by the transmission is the independent control of each track. The ability to run one track forward and the other reverse provides extraordinary maneuverability. Controls are simple. Movements of the tractor are controlled by two small conveniently located handles in front of the operator. These two handles are close together and are held in the operator's hand in such a way that an easy push on the two levers moves the machine forward and a pull reverses the machine. Twisting the levers provides a "spin" turn —releasing either lever so it automatically returns to neutral will permit a "feathered turn," or the track brake may be used to give a conventional turn. Brakes, used mostly for parking are of the air cooled disc type. An additional brake, used for bucket control, is of the same type. Unit parts, such as the transmission case, final drive cases and covers are heavy cast alloy or fabricated steel. Cast iron, customarily used for tractor parts, can be designed to give sufficient strength for average conditions but steel construction gives added strength for shock loads and other unusual stresses under which an excavator or tractor may work as an all around tool. There are two final drives, one for each track.

The construction in the final drives is extra heavy in shafts, gearings, and bearings. There are no clutches, brakes or complicated assemblies in the final drive case. The final drives have been designed in compact units in order to keep them strong and are separated by a spacer piece which is the housing for the rear power take-off and one of the few pieces necessary to change when wider or narrower gauge tractor units are desired. Gearing, sprockets, front idlers and many other parts are cast alloy steel produced with liquid flame hardening. This is a method of martempering the outside rims, subject to strain, abrasion and fatigue in this type equipment, while retaining the toughness necessary for long life in the internal portions of the piece hardened, and completely eliminating heat-treating distortion and scaling. The track rollers are one piece alloy steel castings, carefully machined on special tooling equipment and liquid flame hardened. Each of these is equipped with extra heavy anti-friction bearings in separate steel cages and runs on a heat-treated steel shaft.

Covers and guards are cast steel and protect the lapped face seals which keep lubricant in and all moisture and foreign particles out. This tractor is designed for full oscillation of tracks even when the loading attachment is used. Many new features of tractor design are incorporated in the unit. The operator sits well up front for best visibility of work in loading and bulldozing. The power unit faces the rear and is located at the center of the machine.



Side and plan cross-section and working shot of the Eimco 105 crawler tractor with hydraulic torque converter. Power is provided by a GM 90 hp. diesel through the GM converter.

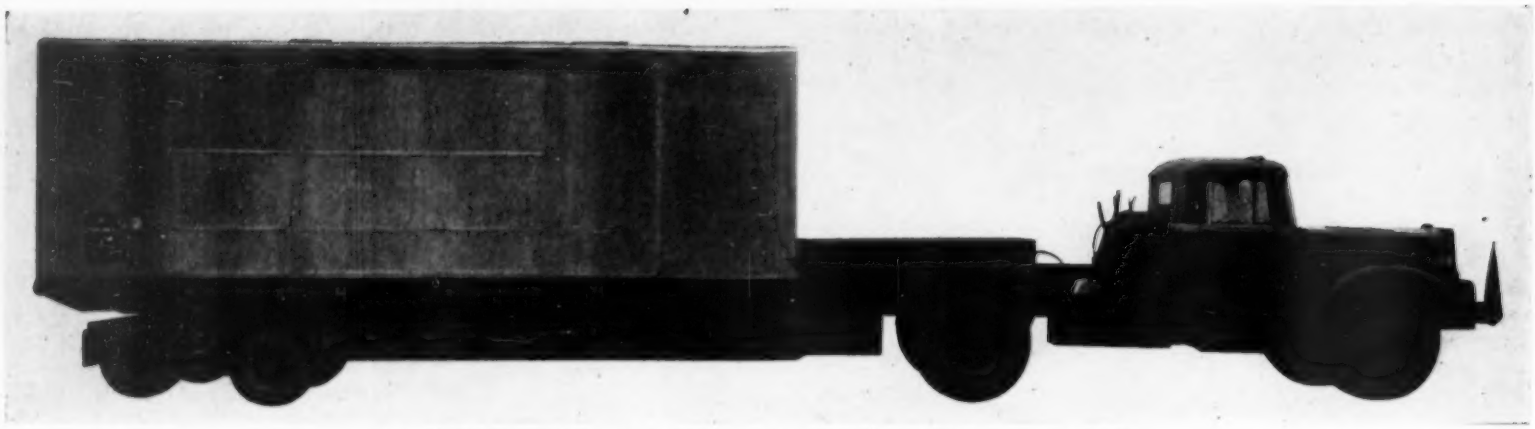


Units now in production use a GM3080 90 hp. diesel engine with matched torque converter. It is claimed that this combination gives the most effective use of power. The loader unit is driven from the front power take-off of the engine and has a two-speed transmission of the same general type as the tractor. For heavy excavating low speed is recommended and for long discharge into big trucks the bucket may be shifted into high speed during travel. For loading small light trucks the low speed is used during the entire loading cycle.

This combination gives the flexibility that loader operators can use to advantage. The rocker-arm loading action of the machine has been designed to give the most efficient loading cycle with more thrust in digging.

A CIVIL DEFENSE REQUIREMENT

A 600 KW. STERLING PORTABLE EMERGENCY UNIT



A Sterling 600 kw. mobile power plant mounted on a standard low-bed commercial trailer. The unit is designed for movement over rough terrain at 35 mph. It can also be transported by water or railway flat-car.

HERE is a completely new, self-contained electric power plant that can be moved on wheels for rapid transit to a devastated area for emergency generating service, or for operation at a fixed location or to provide normal power needs at out-of-the-way places. This power plant was developed by the Sterling Engine Company in cooperation with, and to meet the requirements of, the Bureau of Yards and Docks, Department of the Navy. It is also being manufactured as a commercial unit available to all industry. This diesel engine generating set is a compact unit which answers an important need in civil defense. It is a transportable package which can provide the electrical needs of a moderate size community in the event of any disaster, supplying abundant power where and when it is needed. The unit is fully equipped for independent operation.

This 600 kw. portable diesel engine driven generating set is designed and constructed to provide a complete power unit, ready to operate. It can be transported on a standard 25-ton, low bed semi-trailer. The complete unit, not including the trailer, weighs 45,500 pounds, dry. When filled to capacity with water, fuel oil and lubricating oil, the following weight is added: water, 1,245; lubricating oil, 1,100 and fuel oil, 8,000 pounds. Dimensions overall are: width, 9-ft. 7-in.; height from bottom of the foundation to the top of the weatherproof housing, 8-ft. 8-in.; length, 24-ft. The generating set is designed for transportation over rough terrain at 35 mph. without damage to any component part. It can be operated at ambient temperatures from 0°F to plus 125°F while exposed to maximum solar radiation.

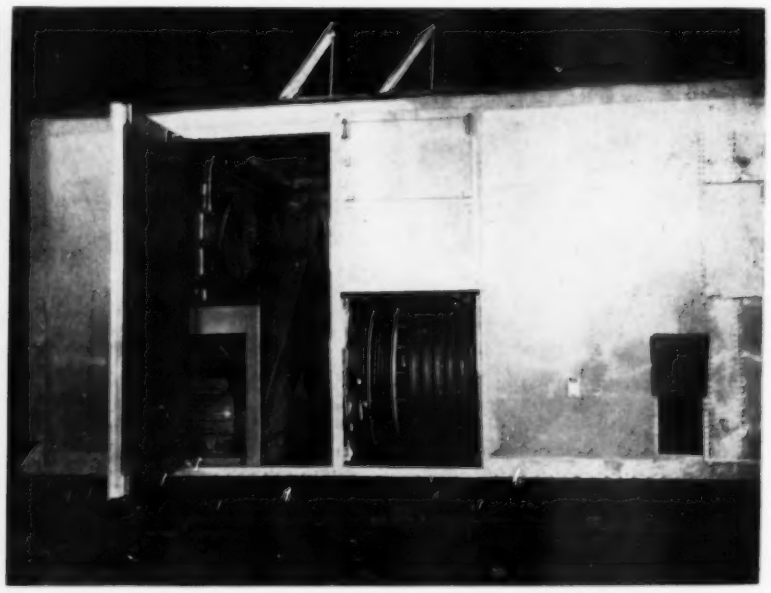
The engine is a Sterling Viking, 8-cylinder, 8-in. bore by 9-in. stroke, four cycle, solid injection turbocharged diesel. The maximum developed brake horsepower is 1000 bhp. at 1200 rpm. The engine is capable of developing 600 kw. continuous to the buss, exclusive of all power consumed by auxiliary equipment. The turbocharger is of the Elliott exhaust driven type.

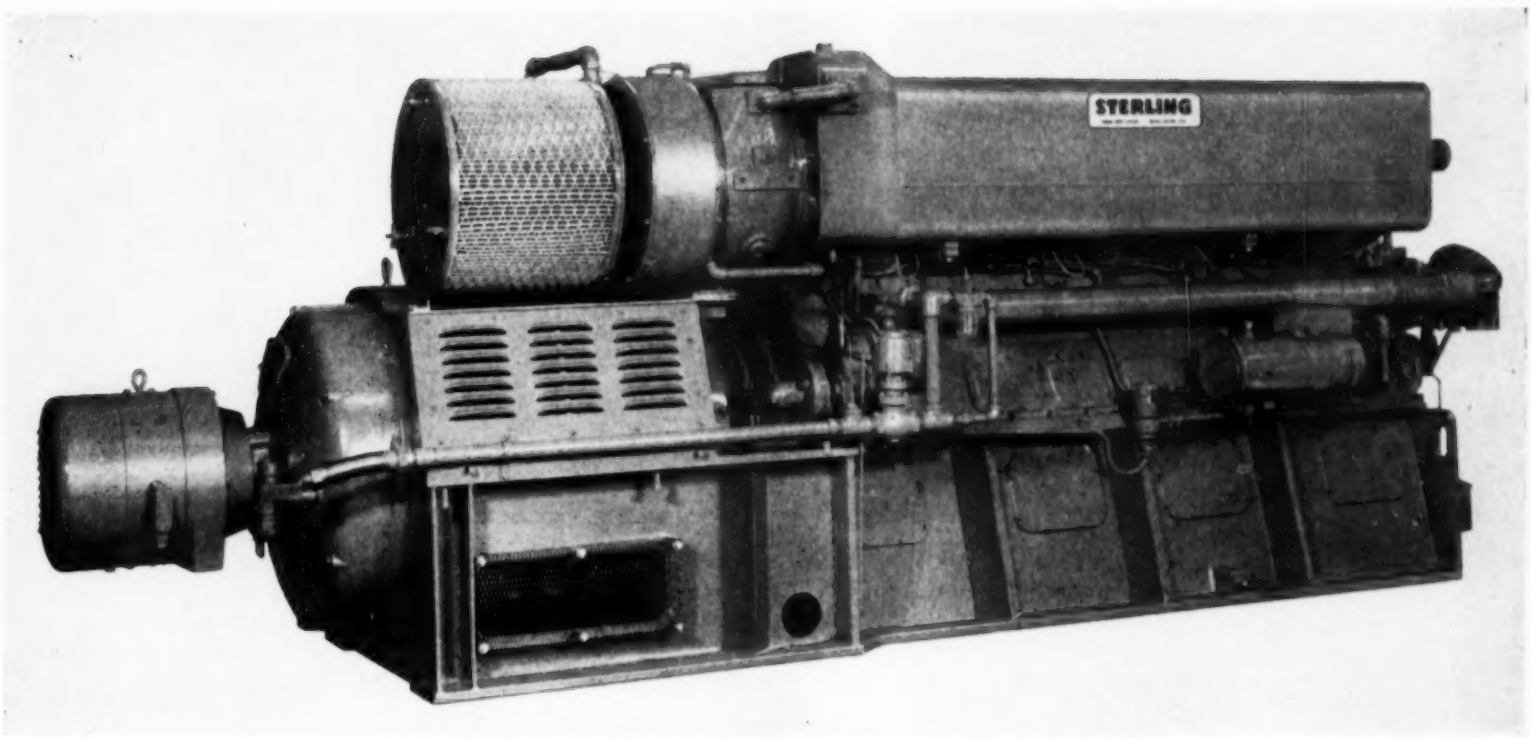
An important feature is the accessibility of internal as well as external parts. Those parts requiring removal are light enough to be dis-assembled by hand without hoists or lifting gear. Loading or unloading of the unit is achieved by means of four built-in jacks. Cable lifting slings are available for hoisting by crane if required. The compactness and light weight of this Sterling diesel engine generating set makes for a reduction in maintenance costs. Eliminated are the costs of foundations, large floor areas and the alignment and re-alignment of engine and generator.

Among the principal accessories used on this group

Camshaft side of the 8-cyl. 600 kw. Sterling generator plant showing the one-piece welded base extending under both the engine and generator.

Left side of the mobile power plant showing the radiator fan and driving motor through the large open door, the cable reel and cables.

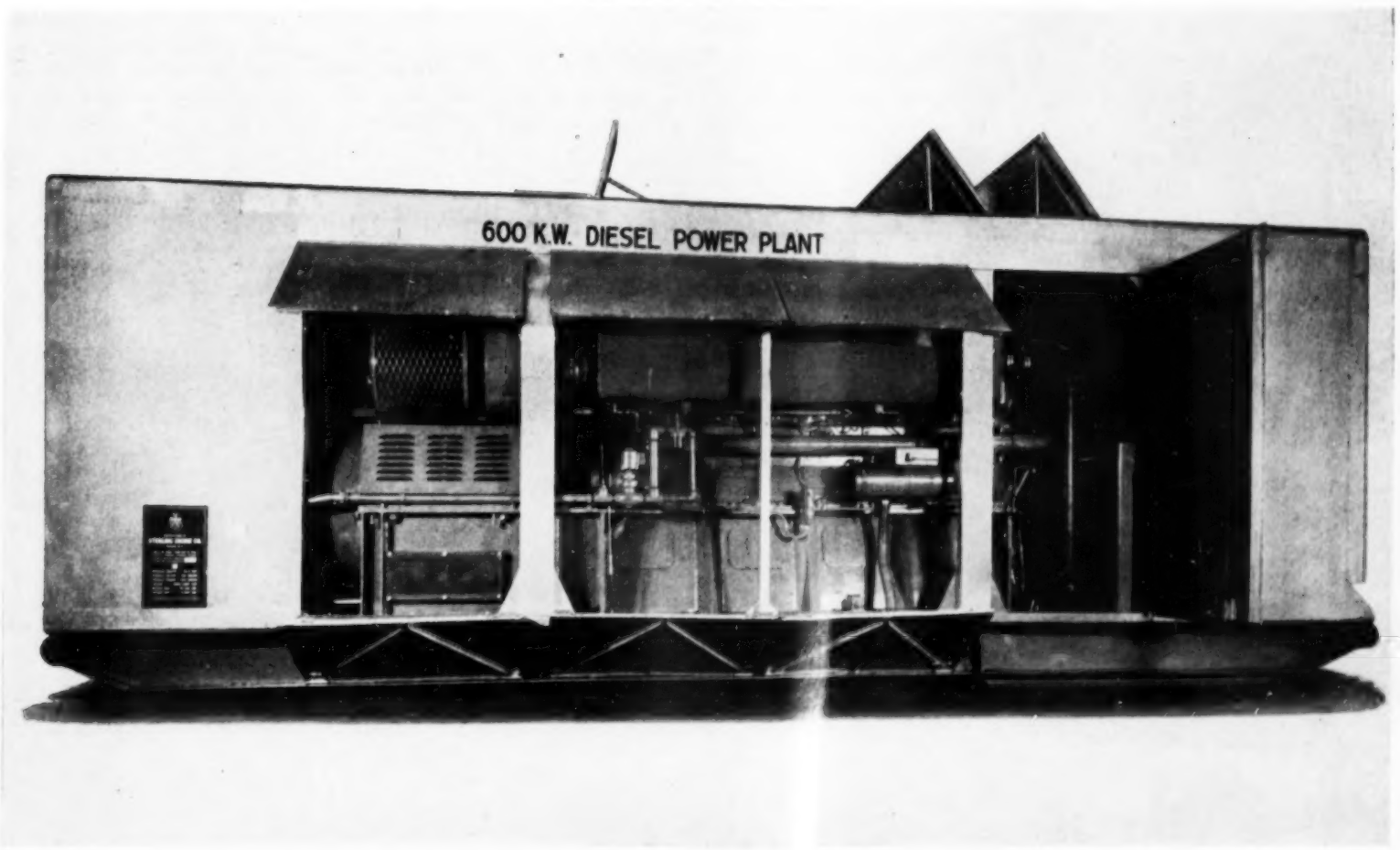




Exhaust side of the Sterling 600 kw. generator assembly showing the 1000 hp. 8-cyl. diesel, the direct coupled generator, the exciter and the turbosupercharger. The 400 kw. set, powered by a 750 hp. 6-cyl. Sterling is of the same general appearance.

of well-designed emergency diesel generating sets are Westinghouse generators, Air Maze air cleaners, Bosch fuel equipment, Nordberg 6 kw. auxiliary generating sets, Exide batteries, Young radiators, Cuno lubricating oil and fuel oil filters, Perfection Stove jacket water heaters, J. S. Barnes fuel oil transfer pumps, Asco automatic switches, Cleveland Graphite Bronze bearings, Koppers radiator fans, Ingersoll Rand air starters, Weston tachometers, Woodward governors, Alnor pyrometers, Thompson Products valves and roto caps, Eaton Zero-Lash valve lifters, Hilco lubricating oil reclaimer. On the engine—Zollner pistons, Perfect Circle piston rings, Ohio Crankshafts forged by Park Drop Forge Company.

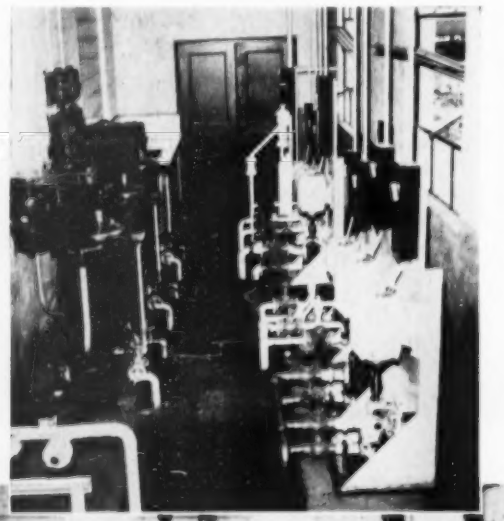
The right side of the Sterling 600 kw. power plant showing the diesel-generator set. This plant has its own weather-resistant housing and built-in foundation which also provides the storage space for fuel and lubricants.



YOU TOO CAN USE HEAVY FUEL

The Second of a Series of Articles on the Successful Use of Heavy Fuel in Diesel Engines. These Comments Are by Robert Cramer, Jr., Assistant Chief Engineer, Nordberg Manufacturing Company.

As briefly as possible, I will tell you about the use of heavy fuel in Nordberg diesel engines. I can't do much more here than state the problem. It has no simple answer. Although volumes have been written on the subject, it can be boiled down to (1) Economics. Why use heavy fuel? (2) What equipment is required on the engine to enable it to burn heavy fuel? (3) What is required to prepare the fuel? (4) What records should be kept and how can they be interpreted? (5) What do fuel specifications tell?



View in the centrifuge room showing the equipment for cleaning and filtering 80% Bunker C—20% No. 2 fuel oil being burned in the Lake Worth, Florida Nordberg engines. Centrifuges are Sharples.

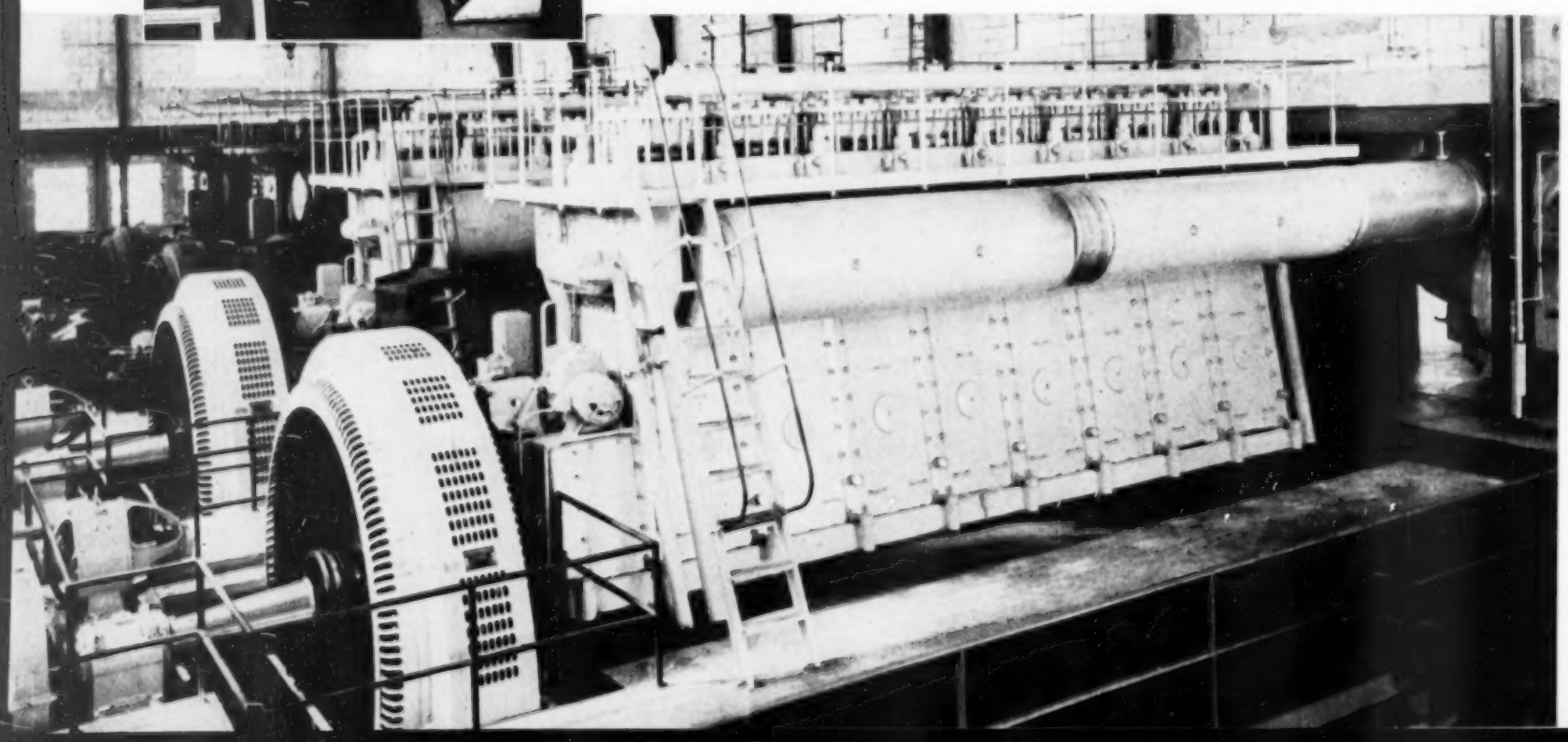
Why Use Heavy Fuel?

The so-called "diesel fuel" and some slightly heavier industrial fuels are distillates. What we call heavy fuels are all residuals. The difference is that the solid impurities in crude oil are not vaporized in the distillation process and, hence, are concentrated in the residual fuel. The small amount of ash, water in distillate fuels are acquired from the containers, pipes, etc. subsequent to distillation, but all of the impurities of the original oil are concentrated in the so-called Bunker fuels or residual fuels. These substances cause wear in engines either by corrosion or abrasion. They cause unexpected difficulties in the operation of injection system parts, they wear away liners and piston rings and they make deposits in the exhaust passages and on the pistons and cylinder heads.

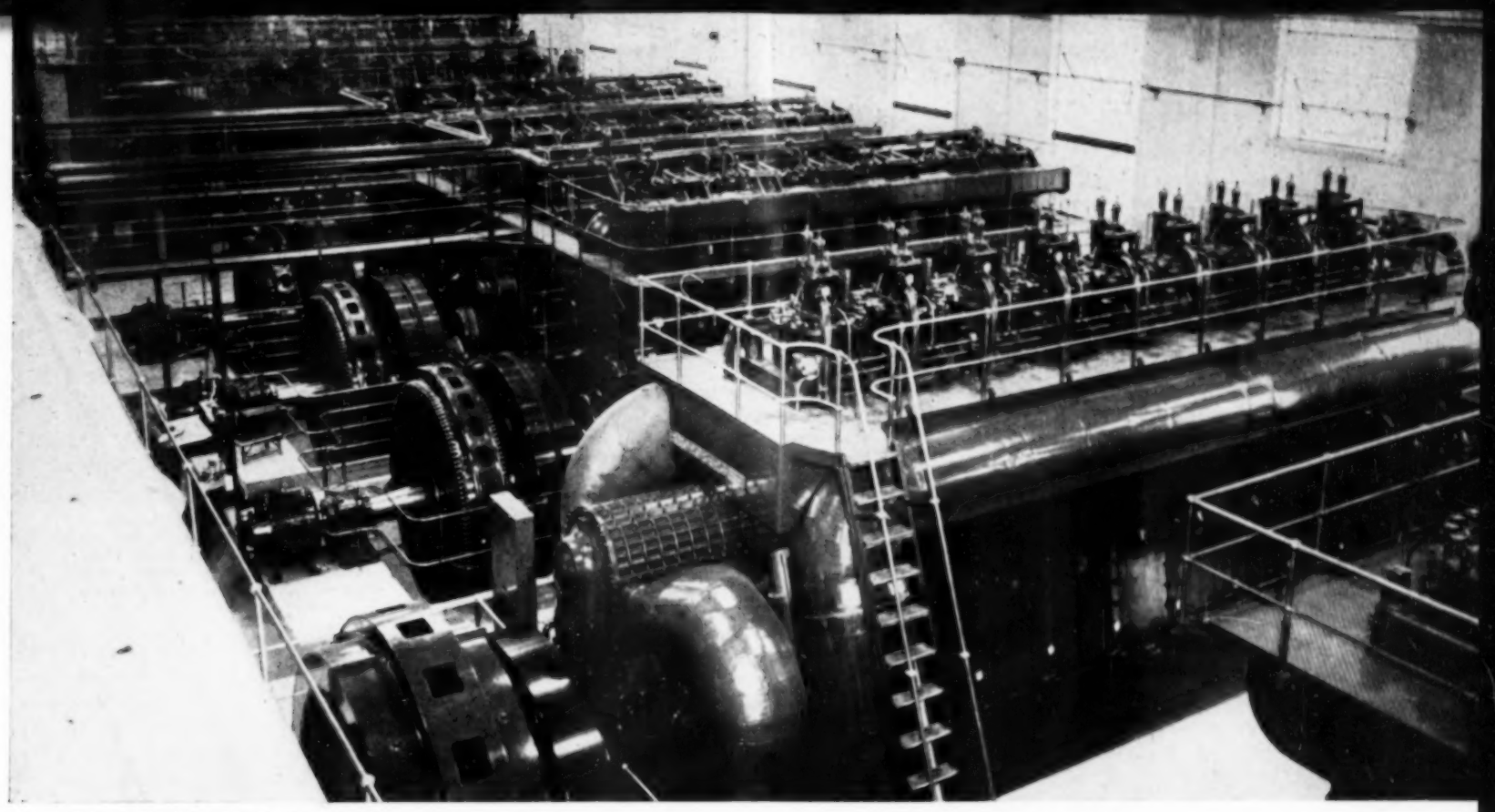
On the other hand, these fuels in some places can be bought for a fraction of the cost of distillate fuels. A simple calculation of a hypothetical case will show what this difference amounts to. The principal competition to a diesel engine power plant is a utility which obtains its power from coal, oil, gas or water power. Basically, the utilities manufacture power on a much larger scale. Therefore, in some cases, heavy fuel means the difference between keeping a diesel engine power plant in operation or shutting it down permanently The remaining economic question is this, "Is the increase in maintenance cost less than the saving in fuel cost?"

What Is Required To Make A Diesel Engine Burn Heavy Fuel?

Taking the plant in Lake Worth, Florida as a typical example, the photographs show the equipment required on the engine and also show the equipment required to prepare the fuel. Beginning with the fuel storage tanks, this equipment, in order, comprises heating, blending, centrifuging, filtration, final heating and metering for preparation of the fuel; insulation of the fuel header, some mechanical modifications of the fuel pumps, and special attention to the cooling of the nozzles of the injection pumps.



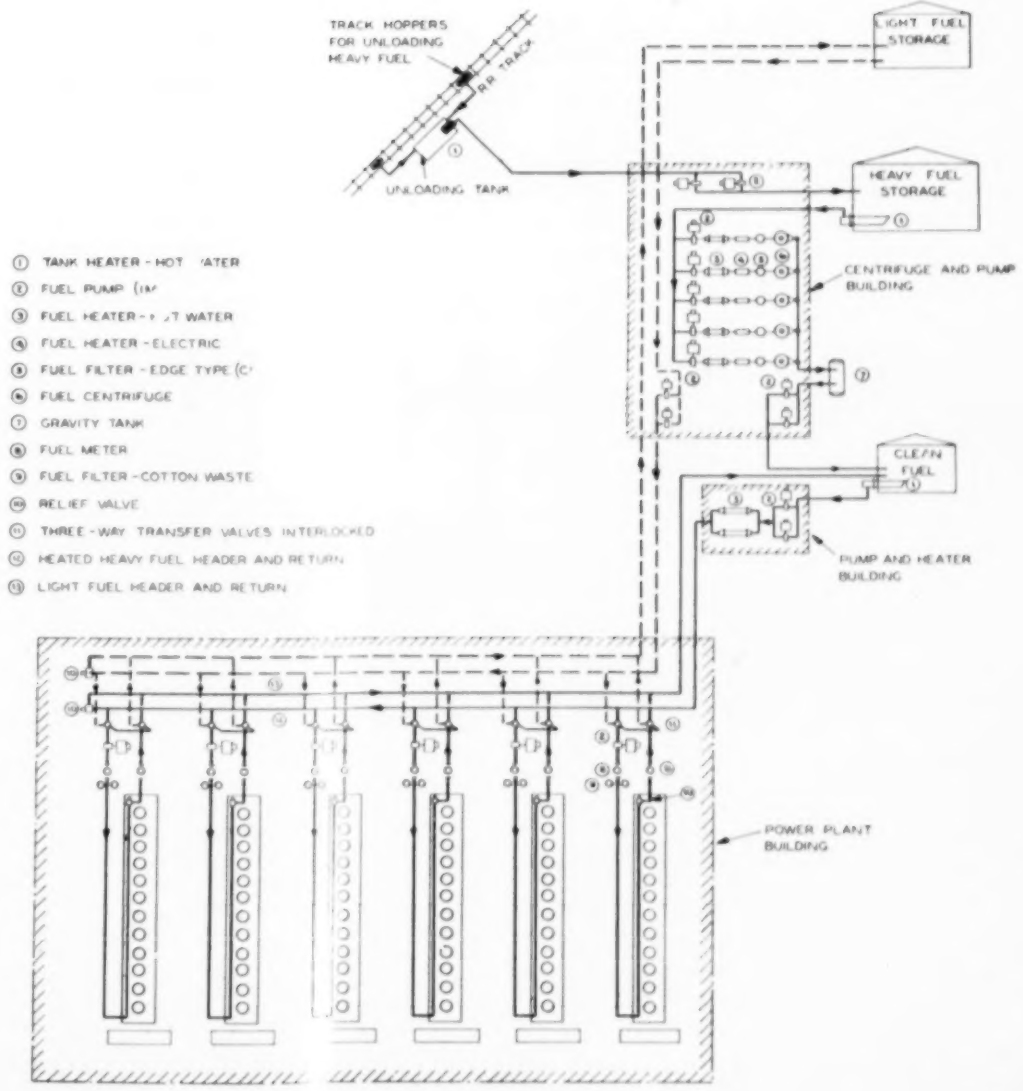
Two Nordberg TS-218-31 diesel generating units at Lake Worth, Florida, with two Busch-Sulzer 6-DHB-27, 2040 hp. each diesels in the background.



The six Nordberg 2-cycle, 12-cyl., 29-in. by 40-in. diesel engines at the Tacubaya station, serving Mexico City.

TACUBAYA DIESEL GENERATING PLANT

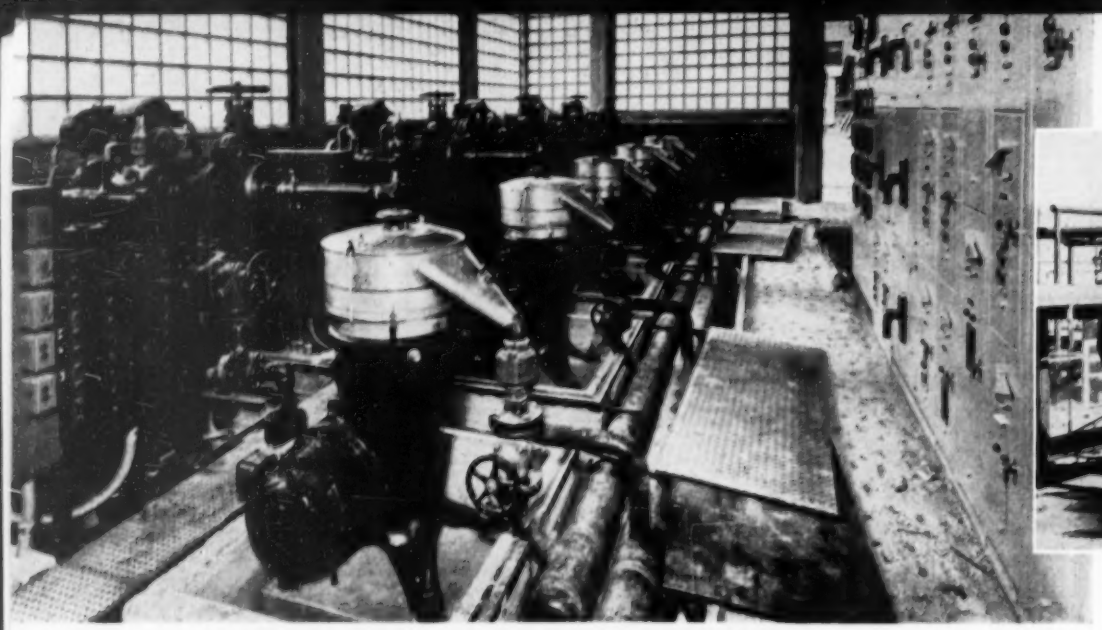
FUEL SYSTEM


TRACK HOPPERS FOR UNLOADING HEAVY FUEL
R.R. TRACK
UNLOADING TANK
LIGHT FUEL STORAGE
HEAVY FUEL STORAGE
CENTRIFUGE AND PUMP BUILDING
CLEAN FUEL
PUMP AND HEATER BUILDING
POWER PLANT BUILDING
① TANK HEATER - HOT WATER
② FUEL PUMP (IM
③ FUEL HEATER - HOT WATER
④ FUEL HEATER - ELECTRIC
⑤ FUEL FILTER - EDGE TYPE (C
⑥ FUEL CENTRIFUGE
⑦ GRAVITY TANK
⑧ FUEL METER
⑨ FUEL FILTER - COTTON WASTE
⑩ RELIEF VALVE
⑪ THREE-WAY TRANSFER VALVES INTERLOCKED
⑫ HEATED HEAVY FUEL HEADER AND RETURN
⑬ LIGHT FUEL HEADER AND RETURN

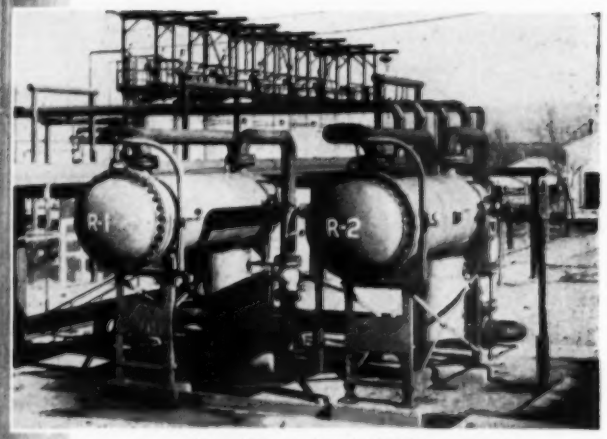
Records and Interpretation

The experience of the burning of heavy fuel at Grand Haven, Michigan, Mexico City, Lake Worth and other places has shown that the problem of burning heavy fuel is simple; the problem of minimizing wear and unexpected failures is extremely complex. There is no simple cookbook recipe. The factors involved include chemical analysis of the fuel, fuel temperature, compression temperatures, fuel nozzle cooling temperatures and heat transfer, metallurgy of piston rings and liners, engine load, cylinder lubrication. All of these factors interact with each other. No one of them has a best value which is independent of the others and they all interact in a very complex manner. The basis for finding the minimum wear combination in any one blend is the system of records which is complete.

The ordinary log, as kept in a power plant, does not give the right kind of information and it is too tedious a chore to dig it out. At the Tacubaya Plant in Mexico City a system has been worked out by which all of the data pertaining to wear and maintenance are recorded on a card record system which shows for each cylinder of each engine the date when any part was removed, the engine hours, a record of what was found and what was done. This record is in the form of numbers in so far as possible such as liner wear in thousandths of an inch, piston ring wear by measurement, comments on average load in kilowatts, cooling temperature in degrees, etc. In addition, a cross index is kept in which the injector experience, piston ring experience, etc., for all the cylinders is combined on one card showing data on this particular component. These records are studied and used as a basis for purchase of repair parts and also their theories as to how the most troublesome components may be improved.



Five De Laval centrifuges and a control board handle the fuel flow from tank cars to clean fuel supply at the Mexico City Tacubaya plant.



Two Warner Lewis Excel-so separators on a pipeline installation. Water separators of this type on a power plant system should be given consideration when such systems are being planned.

This may seem rather elaborate and yet the results in Mexico have been amazing. According to a recent statement from Mr. J. K. Jennings, Assistant Technical Director, Mexican Light & Power, they now feel that they can safely run an engine for 3500 hours (nearly half a year) before it is necessary to open the cylinders. In a similar way, the time each injector may be left in service before pulling it for checking and adjustments is predictable. The very act of making such a record makes the operator think through his problems.

Fuel Specifications

Ordinary fuel analyses tell us little about the troubles that will be encountered burning heavy fuel. As of this time, we don't even have enough experience to evaluate a specific analysis which shows the minor chemical components. We do know that there are a few troublemakers. Vanadium pentoxide is corrosive or at least oils in which vanadium pentoxide occurs cause high rates of wear and, yet, leave polished cylinders. Silica and silicates are abrasive. Sulfur in quantities up to 2% are not particularly harmful when the engines are operated at loads in excess of three-quarter, but high sulfur fuels frequently (not always) have associated other corrosive constituents.

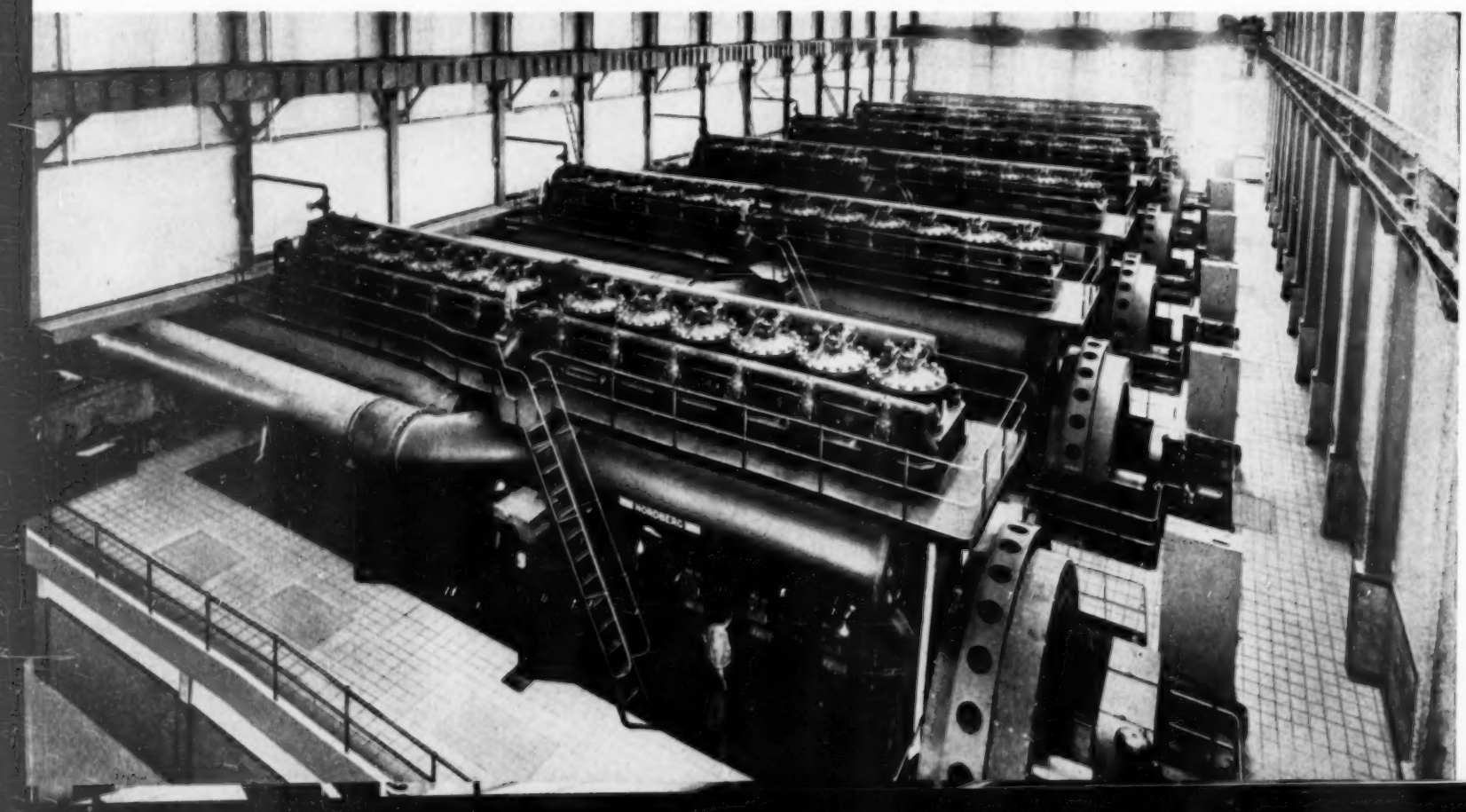
Bunker fuels are usually marketed without specifications and the companies who market them do not guarantee any limits nor do they guarantee the source and, hence, a spot analysis is usually of little value. One of the reasons we have recommended blending equipment in almost every case is that Bunker specifications are so loose that we have felt it advisable to be able to dilute unsatisfactory batches of fuel when necessary with lighter fuels.

Specific Gravity, Baume or API Gravity

The separation of water and fuel which occurs from leakage of condensation or washings into fuel oil tanks can be removed by centrifuging, which depends upon a difference in specific gravity between the water or oil, hence, which approach the specific gravity of water, cannot be cleaned. For this reason, we have usually recommended that fuels having an API or Baume gravity less than 11 should not be purchased and in case only such low gravity fuels are immediately available, distillate fuels should be used until the situation changes.

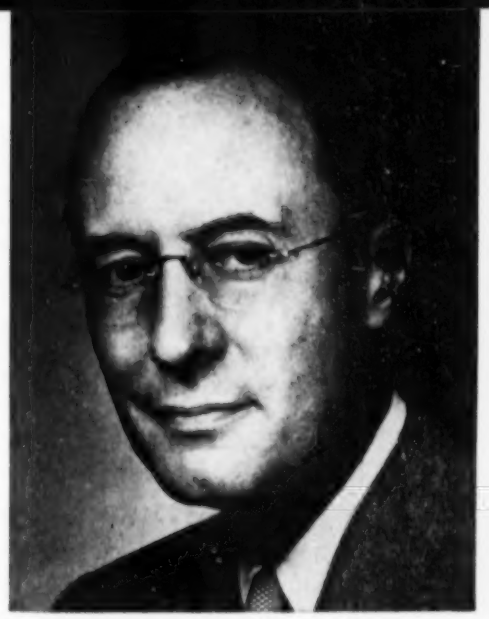
In addition to all of the problems so far discussed, there are frequently political problems which have to do with the control of the personnel of the plant, purchase commitments with certain oil companies, etc., which further complicate the problem. In spite of all this, plants such as Grand Haven, Tacubaya and others owe their existence to the fact that they have solved these problems in a way which enables them to compete with other types of power despite wear and maintenance which can be reduced, but which will never be equal to that experienced with distillate fuels.

Four Nordberg diesel generating units having a total capacity of 17,950 hp. installed in the Grand Haven, Michigan municipal power plant. These engines burn heavy fuel.



TURBOCHARGING THE TWO-CYCLE GAS ENGINE

By **R. L. BOYER***



**R. L. Boyer, Vice-President and Chief Engineer, The Cooper-Bessemer Corp.*

THIS is a brief report of experiences and opinions on the turbocharged 2-cycle gas engine as we see it at Cooper-Bessemer. As we were the first to have such an engine in operation in the field, we have received many requests to prepare papers or write articles regarding our experiences, but have hesitated and still hesitate, to put our experiences and opinions on paper. We have learned many times that written statements on such developments are frequently obsolete before they are printed. For the records this article is written March 1, 1954.

We started turbocharging 2-cycle engines experimentally more than three years ago after studying the possibilities for several years before that. It was certainly logical that we should give every consideration to the problem of turbocharging the 2-cycle engine in view of our experiences with the 4-cycle engine which we have been turbocharging since 1934. That development, which later included the spark-ignited gas engine, is familiar to all. The performance of forty-two 3700 hp. supercharged gas engines at the Reynolds Metals plant is well known; it attained one of the lowest generating costs in history. We say, therefore, that it was perfectly logical that we should have given thought all along to the possibility of turbocharging the 2-cycle engine.

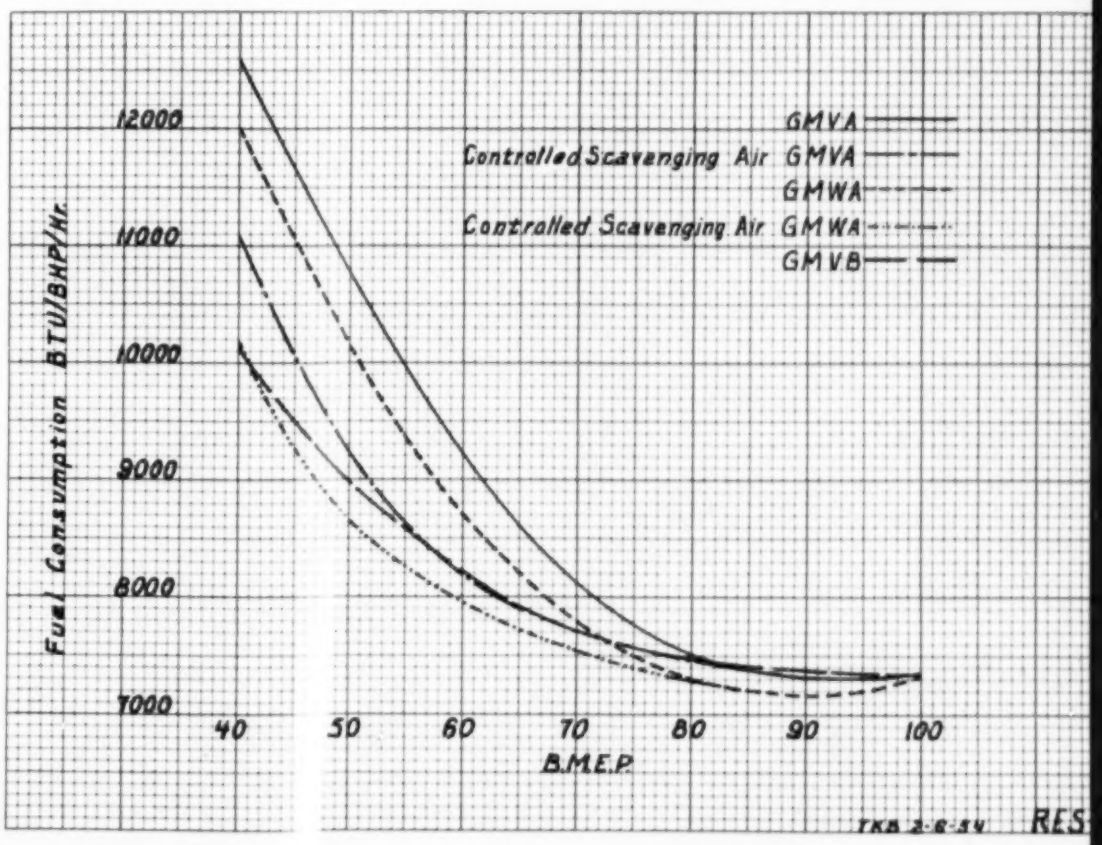
In all probability the business of building heavy-duty gas and diesel engines is not too much different than that of any other similar enterprise where developments are frequent and highly competitive. The tendency is always to engage in a race so that one might attain credit for being first; consequently new developments are often put into the field too soon. I believe all engine builders have been guilty of this, including Cooper-Bessemer. The result is not only excessive cost to the manufacturer but extreme inconvenience, to say the least, on the part of the customer.

Although the turbocharged two-cycle has been a most interesting development and experience, we had been satisfied to keep it under cover, meanwhile testing, improving, and continuing to watch carefully the European developments. (We have had the good fortune to be particularly close to one of the most prominent European attempts at 2-cycle turbocharging.) But good old American competition, for which we are devoutly thankful, frequently changes policies. One engine builder announced last spring that he felt the stage had been reached where the engine could be offered for general use. There immediately arose considerable general interest in this method of scavenging the 2-cycle engine, and we decided it was time one of our engines should be put in the field where we could observe it under operating conditions; therefore, one of our type GMV-10 turboflow engines, normally rated 1100 hp., was converted to turbocharging and has been operating on the line since early in December. As far as we know it was the first turbocharged 2-cycle gas engine to be put to work in the field. It is, as indicated above, a conversion which has a few slight handicaps over a new engine.

We should not be expected to report on all of the experimental work we have done nor divulge any future plans. We regard the scope of this article as that of presenting a few interesting highlights of our experiences so far in attempting to make conservative comparisons between this method of scavenging and other methods which are already in use.

As nearly as we can determine, everyone started with the constant-pressure type of turbocharging. This type requires some additional means of starting the engine and of supplying its scavenging air up to a load which is higher than many of us were willing to rate engines until comparatively recently. Various engine builders approached this prob-

Figure 1. Graph shows the fuel consumption in curve form at variable load. The GMVA is a 14 by 14 engine with gear-driven centrifugal blower. The GMWA is an 18 by 20 engine with gear-driven centrifugal blower. The GMVB is the 14 by 14 turbocharged conversion.

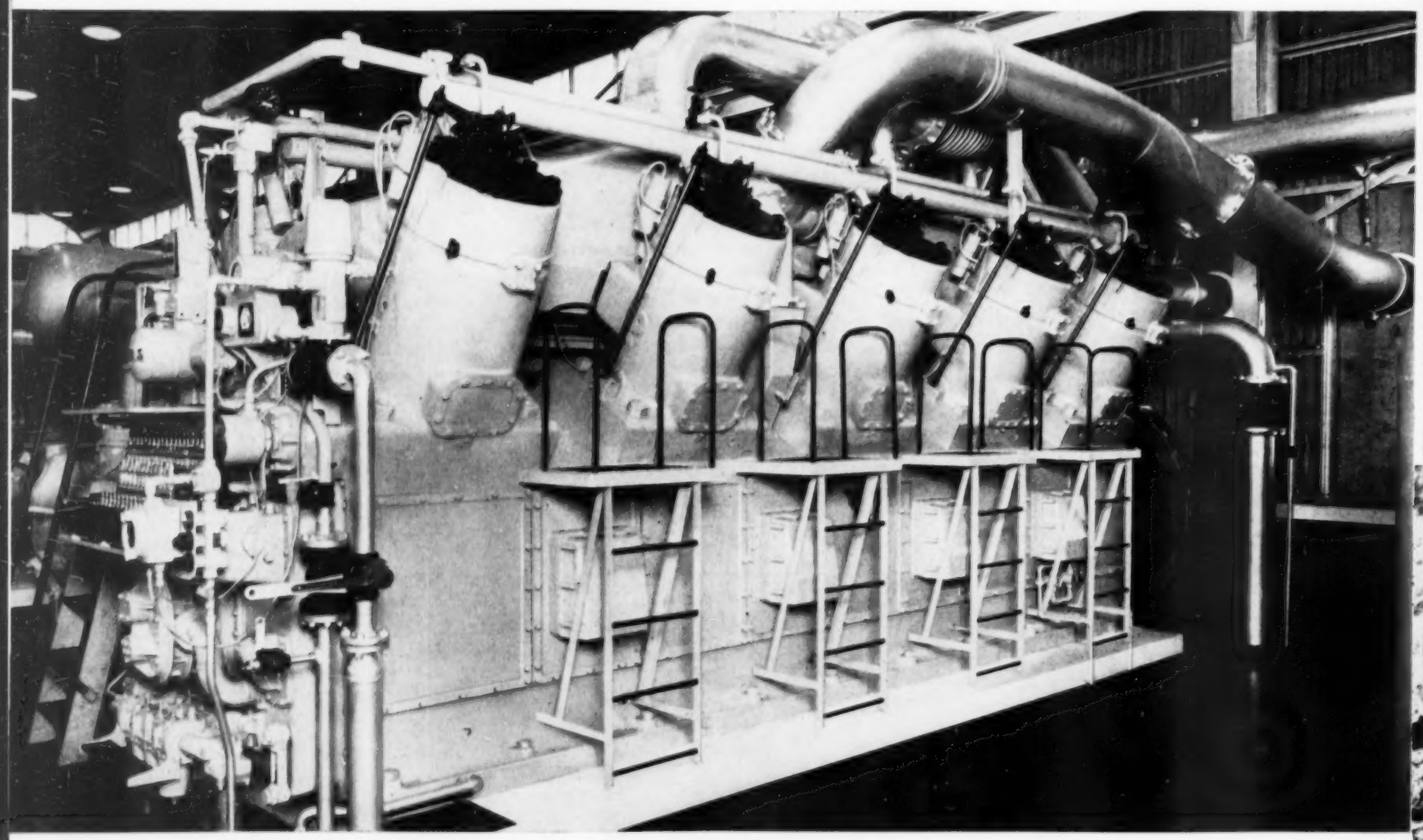


lem from different angles. Our first approach was by means of a combustion chamber by which we ran the turbocharger as a gas turbine to facilitate starting and to provide scavenging air up to the load at which point the turbocharger could take over alone. We also experimented with various mechanical aids, providing mechanically driven scavenging blowers to provide for starting and for the above load conditions. Following those experiences we decided that if we had to have that type of equipment on an engine it would be better if we left off the exhaust-driven turbochargers and used the mechanical means alone. We, therefore, decided that if we were going to concentrate all our efforts on a self-starting system and one which would be self-sustaining at all loads. Our experimental work for more than two years has been concentrated on that self-starting system. We solved the self-starting feature early in our experience; since then it has been no problem.

We have been rather surprised at the extreme interest that has been built up toward the turbocharger means of scavenging. We do not want to jeopardize this enthusiasm, but we do want all factors considered. Apparently the major item which has caused such intense interest is the general feeling that in turbocharging we get our scavenging air for no expenditure of energy. Unfortunately this is not true. The turbocharged 2-cycle engine is relatively efficient. The percentage gain in efficiency over that of existing forms of engines depends on the starting point for the comparison. In the case of our highly supercharged patented system used on the 4-cycle gas engines, there is no difficulty in showing a continuous performance of 6200 btu/bhp/hr. Our form of 2-cycle turbocharging as applied to the field conversion has been showing about 7300 btu/bhp/hr. or slightly less. A prediction is always dangerous for developments can take unforeseen trends, but it would appear that perhaps the ultimate on the turbocharged 2-cycle gas engine may be around 7000 btu's, still maintaining self-starting. How favorable this figure is depends on the type of engine with which it is being compared. We have large numbers of 2-cycle gas engines in the field whose performance approximates 10,000 btu/bhp/hr. With the current performance of the turbocharged engine it, therefore, is possible to save 27% on fuel. We also have large numbers of engines showing an average of approximately 8300 btu's. Converting these engines to turbocharging might save approximately 12% in fuel. Going still further, we have a considerable number of engines in the field which are averaging 7500 btu's. There, it will be seen, we have comparatively little to gain in fuel consumption. Our latest 2-cycle compressor engines with gear-driven centrifugal blowers are showing from 7200 btu's to 7400, depending on the size. Compared to those we have little saving of fuel with which to sell turbocharging. Whether or not we feel we are getting something for nothing we have merely to refer to the fuel consumption for the final answer.

In Fig. 1 we present these fuel consumptions in curve form at variable load. In explanation, our GMVA is a 14 x 14 engine with gear-driven centrifugal blower. The GMWA is an 18 x 20 engine with gear-driven centrifugal blower. The GMVB listed on the curve is the 14 x 14 turbocharged conversion. It will be noted that on new engines there is unfortunately very little to offer in the way of fuel consumption compared to our units with gear-driven centrifugal blowers. On conversions it, of course, is another matter for many of our customers do not have the more modern engines giving these higher efficiencies.

One very important point to consider is the ratings of different types of engines. If turbocharging will permit us to employ higher bmep. then it will have an advantage even though its efficiency may not be materially better. Unfortunately, we feel it is a little early to be certain of these ratings. We have operated with very high bmep. ratings on the test floor and have been inclined to become quite enthusiastic on this score. We have learned painfully, however, that a proper engine rating is not always a matter of percentage of overload ability but is, on the other hand, more a matter of cylinder, ring and piston life. We know that these cannot be determined with any accuracy without months of field time under actual operating conditions and that in order to be certain this must include a hot summer. No one more fully appreciates this latter point than Cooper-Bessemer.



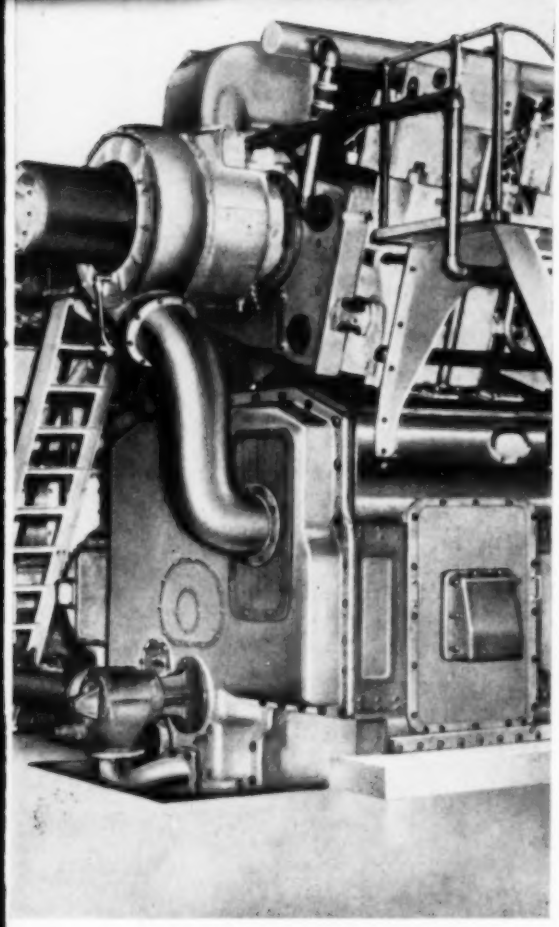


Figure 2. The free end of one of the larger GMW engines with turbocharging, designated as the GMWB.

Figure 3. One of the GMV-10 turbocharged engines installed in the field.

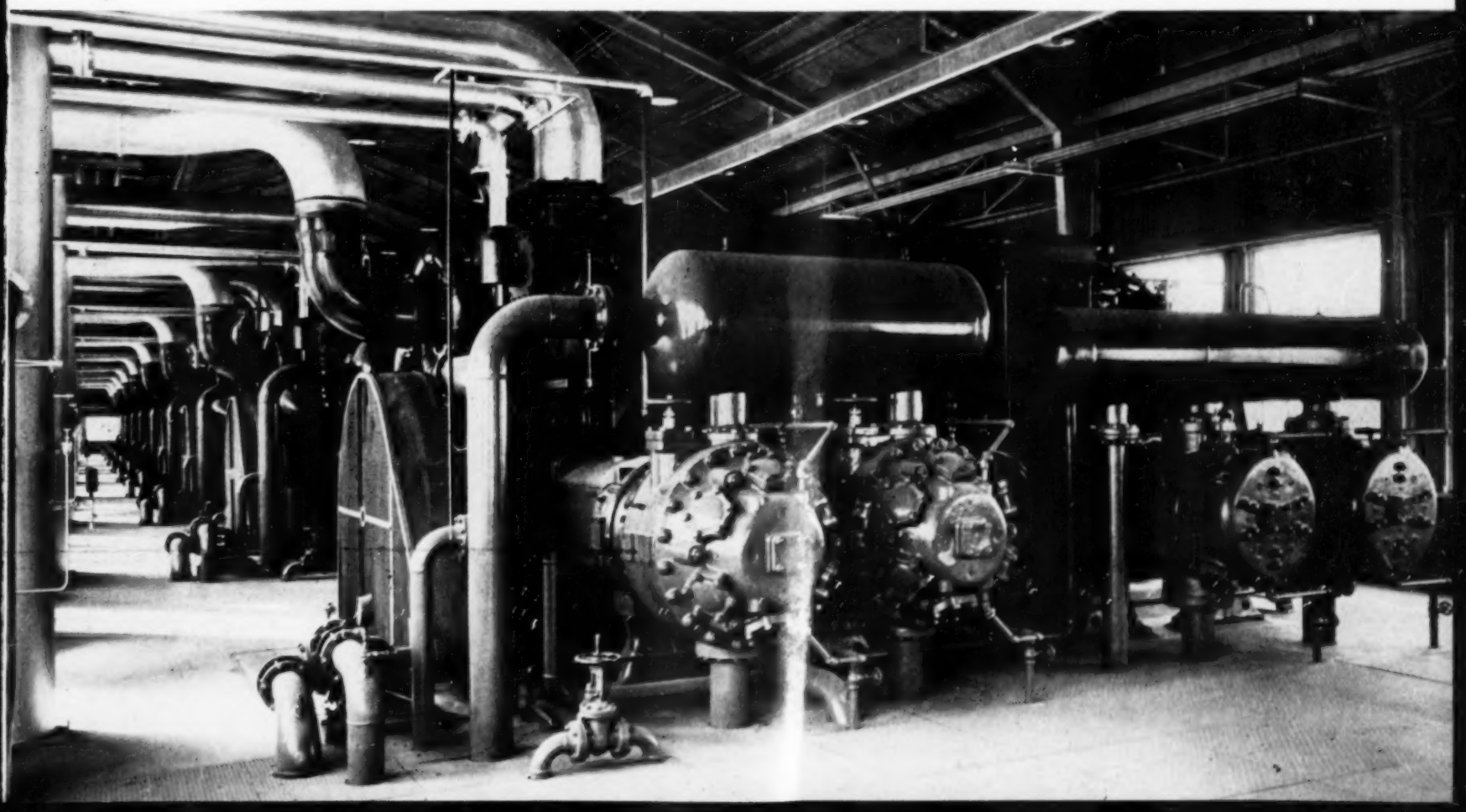
Figure 4. An installation of nine type GMVAs with gear-driven centrifugal blowers.

The engine we have in the field, as pointed out earlier in this article, has been running since early in December. That particular engine has been running several years at 1100 hp., the rating we gave it. Since conversion to turbocharging it has been operating at from 1350-1500 hp.; the latter figure being approximately 92 bmep. The same bore and stroke engine, known as our GMVA which has a gear-driven centrifugal blower, we very conservatively rate at 1350 hp., having demonstrated that it will stand up reasonably well at 1500 hp. It is too early, therefore, to predict whether a final rating of the turbocharged engine gives particular advantage.

A very important item in any engine development is its cost. At this writing we do not have any exact figures, but the preliminary figures would indicate that there is no great difference in cost with the gear-driven centrifugal blower or with turbochargers. One advantage of the turbocharged engine will probably be a lesser heat dissipation to the water resulting in smaller and less costly heat dissipation equipment. This feature has been an important point in the development of the 4-cycle turbocharged engine. Our standard type GMVA with geared centrifugal scavenging has a maximum heat dissipation of 1700 btu/bhp/hr. The turbocharged version has a considerably lower rate of heat dissipation but almost solely because the exhaust manifolds in the turbocharged version are not cooled. We have been accustomed to cooling exhaust manifolds, mostly for station comfort, but that feature is responsible for about 40% of the water heat dissipation and, therefore, that percentage of the cost of the cooling equipment. The turbocharged engine will dissipate some additional heat to the engine room although the manifolds are protected by insulation. The only reason we do not have water-jacketed manifolds on the turbocharged engine is that we want to conserve the heat energy for the turbine. To be fair to the mechanically scavenged engine it also may have dry insulated manifolds. By doing this we find the heat dissipation rate of the mechanically scavenged engine to be under 1100 btu/bhp/hr. and comparable to the turbocharged version.

With this article we are including three photographs for direct comparison. Fig. 3 is one of the GMV-10 turbocharged engines installed in the field. Fig. 4 is an installation of nine type GMVA's with gear-driven centrifugal blowers. Fig. 2 is the free end of our larger GMW engine with turbocharging designated as our GMWB. This shows rather clearly how the turbocharger has been worked into the exhaust and air systems so as to be readily adaptable to existing engines.

We might conclude by a very brief summary. It would appear at this writing, and again we point out that this may be obsolete before it is printed, that fuel consumption while perhaps a little lower on the turbocharged type engine will not be materially lower than with the gear-driven centrifugal. The fuel consumption gain can best be obtained by converting existing engines which do not have the higher efficiency of the later developments. It yet remains to be demonstrated whether the turbocharged engine can be rated at a higher bmep. than the engine with the gear-driven centrifugal. Costs seem to be about the same either way. We feel it is too early to be certain of the future of the turbocharged engines and that even with our present field experience in addition to three years of experimental work, we must have more hours with part of them at summer temperatures before we would be willing to go into turbocharging on any broad scale. We believe turbocharging is one way of getting scavenging air in the future but it does have its competition.



THEY BARGE INTO THE JUNGLES

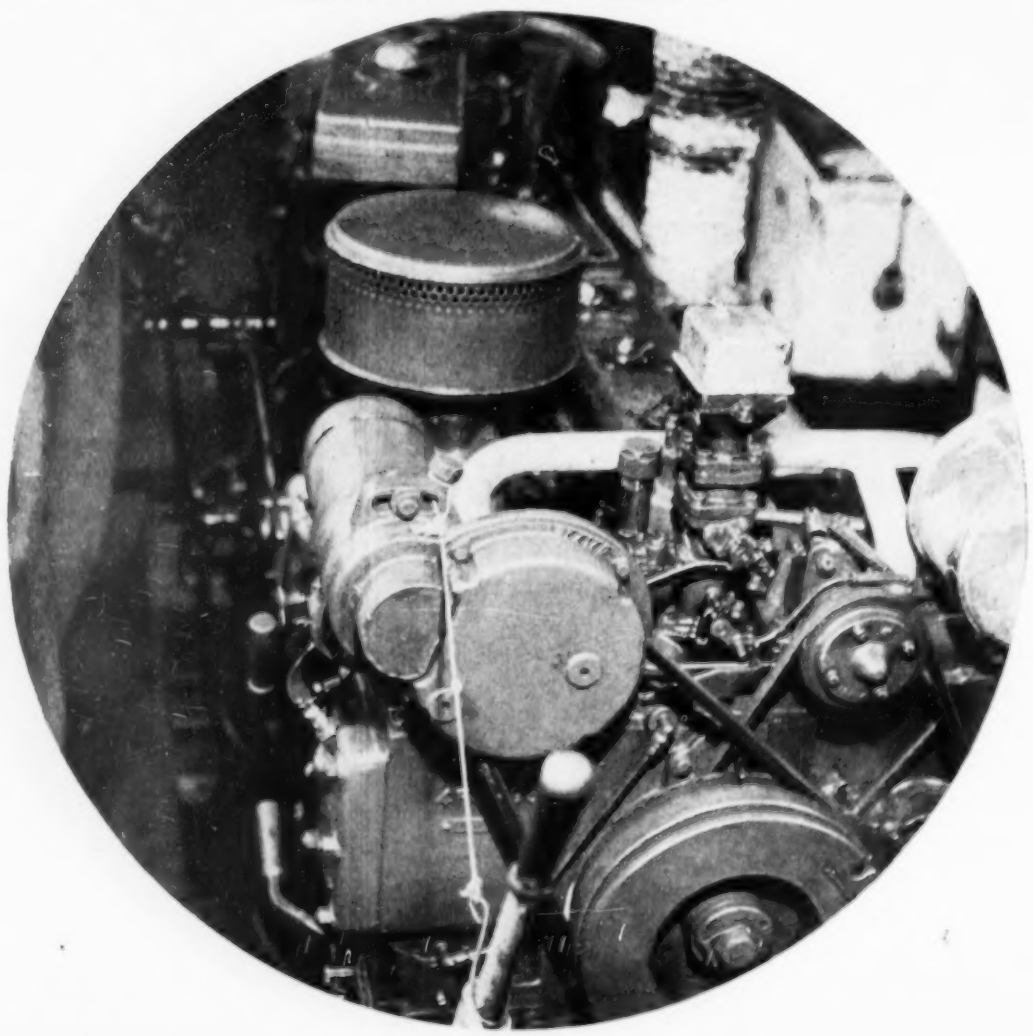
By JAMES JOSEPH

TRES BOCAS, Colombia—You'd have to look hard to find Tres Bocas (Three Mouths) on the map, if it's there at all. Probably it isn't. Yet Tres Bocas, at the convergence of the Rios Tibu, Nuevo and Sardinata is very real and important. Straddling the Venezuelan-Colombian border, Tres Bocas is terminus port for powerful river-going diesel launches and their barges, toting heavy oil field equipment from Venezuela's Lake Maracaibo. Without the port there might never have developed the fabulous 70,000 hectares of jungled No-Man's Land which the petroleum world has come to know as the Barco Concession. Besides oil, the Barco has another claim to fame: as last refuge of the savage Motilon Indians, the world's most persistent isolationists. Since 1936, the Motilones have disputed every encroaching foot taken by jungle-toughened oilmen.

And though the Barco's 150 Americans and 3000 Colombian obreros get some supplies by air, the heavy stuff—the tools of production—most often come by river. This means they come by diesel-towed barge. For all but two of Catatumbo Transportation Co.'s 8 tugs and two self-propelled barges operating out of Lake Maracaibo are diesel driven. That's but part of the saga. The other concerns the run into Rio de Oro camp—on the river by the same name—some 70 kilometers by land north of Tres Bocas, but a good deal farther by river. The camp lies in the very heart of the Barco and is Colombian Petroleum Co.'s boldest penetration into Motilon-Land. And often, as the tug steers the Rio de Oro's channel, arrows thud against the heavy-mesh "Indian" wire enclosing its wheel house and aft deck. It's then that the tug's 5- to 9-man crew dives for cover—safely inside the stout wire barrier. Only occasionally are there casualties.

Manuel Gonzales, skipper of the tug *Bolivar*, and a veteran of 15 years on these rivers, ran a Motilon barrage in January, 1951. It happened, as always, on the Rio de Oro. As Gonzales recalls, it was around 10 a.m. of a humid morning, typical of the rainy season. The channel veered close to the bank, and just as the barge-towing tug drew near, arrows came slamming inboard. The Motilones were clever. They'd spotted a breach in the tug's protective wire and made it their target. Six arrows embedded themselves inboard. Two missed the gap and hung up in the wire. "It was close," admits Gonzales, "but we've been closer."

The power plant of the small river craft *Bolivar* is this Caterpillar D-318. It is mounted amidships and protected on all sides by Indian wire.



The large barge fatality occurred in 1936, when an American was shot in the elbow. He was rushed down river by diesel launch, picked up by seaplane and flown to an oil company hospital in Maracaibo. Gangrene set in and the man died. All told, 150 arrows have found their mark on the Barco. Yet only about 15 percent of Motilon targets have died. One reason, of course, is that the arrows aren't poisoned. Yet their steel-hard, black palm-wood tips are disease laden. As one Colpet (short for Colombian Petroleum) driller cracked, "I wish those bastards would wash their filthy hands before setting down to make arrows." No one shrugs off the Motilones, nor the fact that their arrows, fired from 6-ft. bows, can tear clean through a man from 50 yds. There've been three Barco casualties in the past year. Has Gonzales, with all his river years, ever seen a Motilon? "Just once," he admits, "and then only for a moment." His experience is typical. Since 1936, only three Motilones have been

At Tres Bocas, barges have just arrived from Maracaibo after a six day upstream trip through treacherous waters. The cargo includes trucks, oil well casing and lubricants.

taken captive on the Barco: all were young boys.

Gonzales, like other Venezuelans who man Catatumbo Transportation Co.'s fleet, is devilishly proud of his dieselized scow. He has right to be. There are two large launches, one with twin gas engines, the other, Gonzales' own *Bolivar*, with a single D-318 Caterpillar diesel. The engine's 6 cylinders develop 80 hp. at 1600 rpm. and drive a single propeller through a model MC-165 Twin Disc marine gear, 1.96 to 1 ratio. The *Bolivar* is rated 10.8 tons, is approximately 45-ft. long, 7-ft. wide, and has a 3-ft. draft. Catatumbo Transportation Co. (home-based in Maracaibo) operates 6 smaller launches, most of them powered by GM diesels developing 85-100 hp. Smaller tugs pull a single barge; the two bigger units, two barges each.

Operations, however, are two-stage. From Maracaibo, two self-propelled 250 ton barges, their Murray & Tregurtha Harbormaster units powered by GM 6-71 diesel engines, carry freight 100 miles to the mouth of the Catatumbo river, then upstream 80 miles to Encontrados. At Encontrados, cargo is loaded onto the smaller towed-barges and the journey upstream continues. The big, self-propelled lake barges are 125-ft. long, 25-ft. wide and draw about 5-ft. of water loaded. They can handle upwards to 200 tons apiece and make good time on the 180-mile trip from Maracaibo to Encontrados. Five of the eight tugs which tow barges upstream from Encontrados are powered with GM 371 diesel engines. The *Bolivar* is dieselized and there are two gasoline-engined craft. GM diesels are keel-cooled because of the river water's high silt content which would plug heat exchangers and wear out the raw water pumps. Their hydraulic reduction gears have a 2:1 ratio and use a 26 in. x 20 in. propeller. The GMs are overhauled annually by Cutisa, local Maracaibo agents for General Motors. Two types of welded, all-steel barges are currently in use. There are nine 70-ton barges and six 50-tonners. Typically, the smaller are 65-ft. long, 16-ft. wide and have a 3-ft. draft, loaded.

Life on these jungled watercourses isn't easy. First off, operations by necessity are confined to the rainy season which takes on new meaning when you consider that Rio de Oro camp regularly records 300 inches annually. The camp's rain gauges once measured 6 inches during [illegible] hours. Add to the sweltering humidity (up to [illegible] per cent, on occasion) a river current that averages about 10 kilometers an hour. Add the danger of Indians and channels as crooked as a shepherd's staff. Catatumbo's big tugs carry a 9-man crew, two shifts working 16 hours out of 24, getting underway at 6 a.m. and not mooring until 10 p.m. Small launches, with a five-man crew, work 8 hours, usually tie-up for the night. During off-hours, the men fish and hunt, but prudently stick close to the boat's protective screening.

Distance from Lake Maracaibo to Tres Bocas is measured in days, not kilometers. It's "6 days upstream, 3 days down"—generally. Sometimes near the end of the rainy season the river suddenly falls, stranding men and equipment for days on end. Even during high water there are delays. Sometimes a torrential downpour blocks the channel with a fallen tree. When that happens the launch usually unhitches, speeds to Tres Bocas, takes on a diesel tractor and hies back to the river block. The tractor's put ashore, a line hitched to the log and the channel cleared. Despite Nature's delaying tactics, a surprising tonnage of freight moves from Maracaibo to Tres Bocas, thence over 6 kilometers of black-topped road to Colpet's main camp, Tibu. About 800 tons monthly are unloaded at Tres Bocas. In October, 1953, 48 barge-loads reached Tres Bocas, another 6 arrived at Rio de Oro camp.

Colpet's Rio de Oro Camp along the Rio de Oro. Across the river (site of derrick) is Venezuela. This side is Columbia. Clearing is patrolled at night to ward off hill-hiding Motilones.

One of the occupational hazards of operating the river craft in Motilon-Land. This vicious looking arrow is the reason for the protective Indian wire on tugs and barges.

with a total 1700-tons. They toted new Ford trucks (most Colpet automotive stock is Ford), machinery, oil well casing, cement, provisions and non-perishables from the states. Biggest item was a 72-ft. long gas pressure vessel—for Tibu's new refinery—weighing 32 tons. Most of this equipment, save the tank, was unloaded by the port's single, 15-ton derrick which overhangs the river bank, for there's no dock—just a hundred feet or so of steel piling and the derrick.

Sometime later I haunched over a map with Colpet's transportation superintendent, Jack Barber. Jack was explaining why most bargemen are river veterans of five, even 15 years. He pointed to the great vegetated wilderness, a kind of lowland which sinks away from the Norte de Santander range on the Colombian border, eventually forming Lake Maracaibo. Rivers ran vein-like through the region, and lakes were everywhere. "Looks easy on a map," Barber said, "only it isn't. Requires real skill to pull heavy loads up river, even more to take them down." Later we watched derelict trees rushing downstream. They weren't "floating"—they were racing, as if motor-driven. And this, Jack said, was only "average" rainy season current. It wasn't difficult to imagine the strain upon a tug's power plant as it labored upstream. Hook on 70-tons of freight and the job seemed herculean.

Two Colpet camps, primarily, are river supplied. One, of course, is Tibu which lies just north of Tres Bocas. The other is Rio de Oro, whose 160 men get some supplies by air (Colpet has its own air fleet of three C-47s), but all the heavy stuff by water. To reach Tres Bocas, barges ply down Lake Maracaibo, up the Catatumbo river to its junction with the Rio Tarra. It's a 3 day trip from Maracaibo to the Tarra, another 3 days to Tres Bocas. To reach Rio de Oro, barges take the Catatumbo to its junction, near the Venezuelan-Colombian border, with the swift Rio de Oro. Generally this is the only sector beset by Motilones, although they range on both sides of the border.

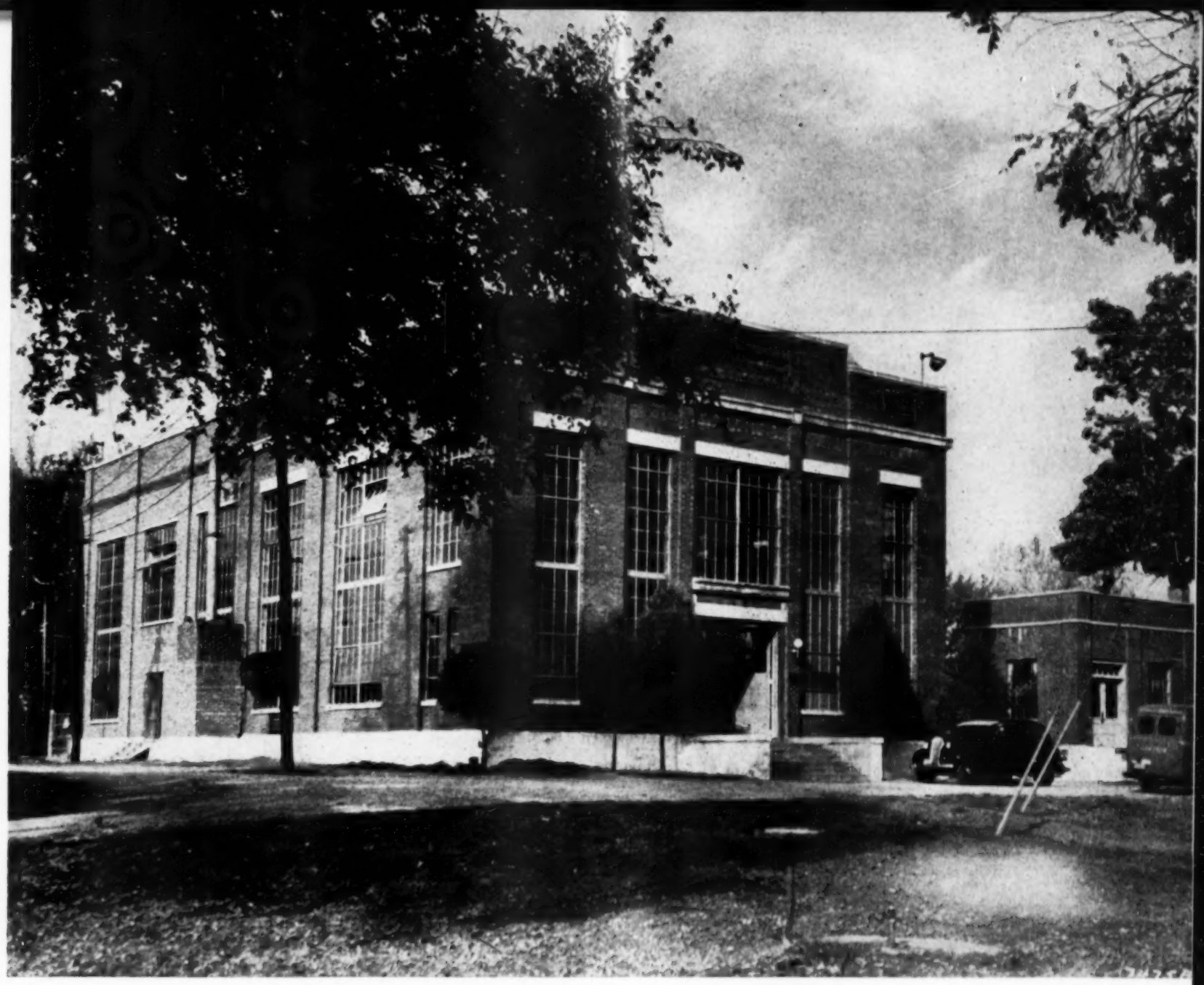
From all this, its pretty obvious that dieselized equipment has proven itself. Here are some typical examples: Catatumbo Transportation Co.'s launch *San Miguel*, a single-engined craft, has been a work horse, yet its GM 371 diesel hasn't needed overhaul for more than a year. Its 26 in. x 20 in. propeller

Capt. Manuel Gonzales at the *Bolivar* wheel, behind the protection of heavy mesh Indian wire.

is enclosed in a tunnel box, protection against underwater obstructions. The *Bolivar*, despite heavy loads, carries only an engineman, but no licensed mechanic. "Don't need one," say Gonzales, "major trouble seldom develops." The *Bolivar* with its single diesel is assigned the same haulage as the *Danta*, which has two gas engines and double screws. Most stateside barging operations use tugs or launches to push. But jungle rivers and their corkscrew channels demand greater flexibility. Thus Catatumbo Transportation pulls its barges, towing them with a single 170-ft. long, 1½-in. manila rope, doubled so that generally a barge lags 85-ft. behind its tug. Barges have a rudder and steersman to keep them channeled and tracking.

Jungle-river navigation is further complicated by streams rising spectacularly within but a few hours. It's common for normally fast rivers to become raging maniacs after some upstream downpour contributes tons of new water. Often current increases from the normal 10 kilometers an hour to nearly 20, and a 16-ft. rise over a 3 hour period is not uncommon. When current and a sudden river rise combine, bargemen have their hands full, what with 50 to 70 tons of cargo tied on behind. Often nightly tie-up is impossible, since in times of raging waters it's often safer to be midstream than moored—if indeed a mooring could be found. All this demands power and more power, and along the whip-lashing rivers of the Venezuelan-Colombian frontier, diesels are supplying that power.

Colpet owes a goodly share of the Barco's average 22,000 bbl/day production to intrepid river navigators. And in round-about fashion,many an American stockholder in Texas Company and Socony-Vacuum—which own a major share in Colpet, can thank bargemen and their diesel scows for keeping Barco productive. For it takes savvy to barge into the jungles.



Attractive brick exterior of Fredonia, Kansas municipal diesel electric generating plant.

FREDONIA, KANSAS

Installation of a 12-Cylinder Nordberg Radial Duafuel Engine Fits Limited Space Requirements and Affords Economy of Operation

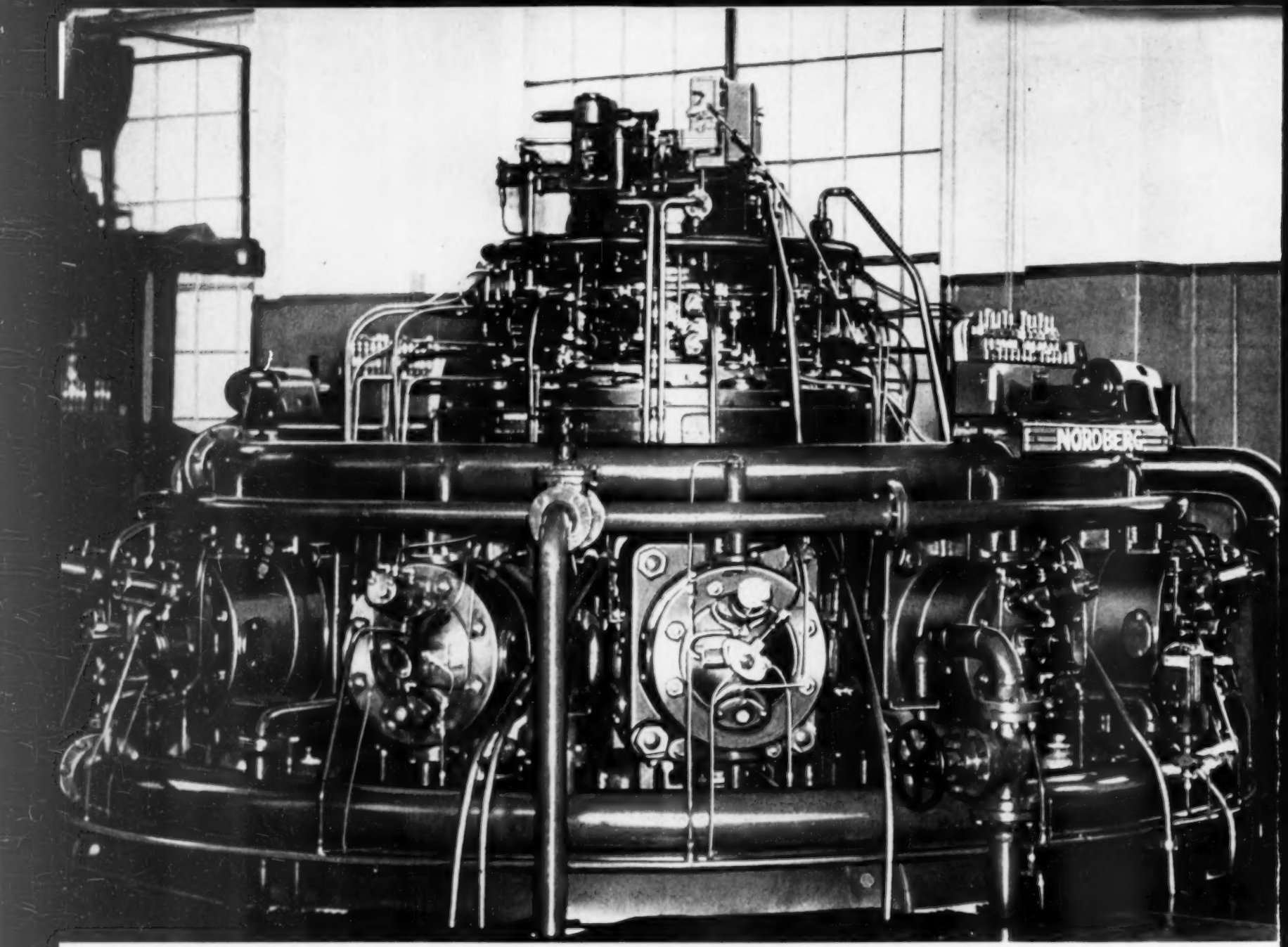
By G. W. OTTO*

FOR more than a quarter of a century the municipal power plant at Fredonia, Kansas has been making a profit and at the same time supplying electricity to residents and industry at rates well below average. (See DIESEL PROGRESS March 1952.) As part of the city program to maintain this efficiency, Fredonia recently completed the installation of a Nordberg two-cycle, twelve cylinder radial engine equipped with a 1500 kw. generator. This engine operates on the Duafuel principle: the first of this type to enter commercial service of this kind.

Fredonia is a thriving community of 4,000 population in southeastern Kansas. Besides its dominance in the field of banknote printing, the city has considerable industrial activity for its size. There are two alfalfa mills, three grain elevators, a large brick manufacturing plant and two locker plants, bringing the industrial power load to 40 percent of the total. Favorable rates undoubtedly have encouraged business and promoted the expansion of residential consumption. The home user pays just 5 cents for his first kilowatt-hour and rates scale down to 2 cents. Charges for the big power user start at 3 cents and go down to 1½ cents.

Since 1924, Fredonia has owned and operated its municipal power and light plant with air injection diesel engines using a cleaned low gravity crude to supply the power. In 1948 a 900 kw. Nordberg six cylinder Duafuel engine was installed to supple-

Superintendent and engineer



The compact size of the Nordberg Radial Duafuel engine made it ideally suited to the limited space requirements of the Fredonia plant. This 12 cylinder unit replaced a three cylinder air injection engine.

ment the power from the older engines. This engine has operated satisfactorily on dual-fuel with a resultant reduction in plant fuel costs of over $1,000 per month. Although supplementary power is available from an outside source a short distance away from town at attractive rates, the City of Fredonia commissioners decided to stay in the power business and increase the output of its plant. Installation space was a critical problem since all generating positions were filled. It was decided to remove one of the original engines, a three cylinder air injection unit and utilize the space for locating the new unit. However, this space was too limited to install a 1500 kw. low speed in-line type engine. Therefore the Nordberg radial engine was considered. It was found that this engine could be easily installed in this available space.

After preliminary adjustments, the Nordberg Duafuel radial went on the line November 9, 1953. Since then it has been down only a few hours to check alarm systems and automatic control devices. This new engine is similar in construction to the 274 spark-fired engines installed by the Aluminum Company of America and Kaiser Aluminum in their southern reduction works. It is, however, of the Duafuel type, with 12 cylinders of 14 in. bore and 16 in. stroke, operates at 400 rpm. and drives a 1500 kw. Ideal generator. From the very beginning this Nordberg engine has operated very satisfactorily on dual fuel. The cost of high quality natural gas (1040 Btu. per cu. ft. LHV) is relatively cheap (20 cents per M cu. ft.). Pilot fuel oil of 19,000 Btu. per lb. (HHV) is available at our plant for 9 cents per gallon. This will result in an overall average unit fuel cost far below that of the twenty to twenty-nine year old air injection diesel engines.

The engine-generator foundation required only 27 cubic yards of reinforced concrete which is a small foundation considering the power output of the engine. The much publicized radial engine now utilizes its sub-base to house a recently designed gear housing. This gear arrangement is engine driven and operates the lube oil pump, jacket water pump, raw water pump, scavenger air blower, and the exciter, making an unusually compact arrangement of auxiliaries. A closed cooling system is employed in this installation to control the engine temperature and scale deposits even though the raw water in the spray pond is treated. The scavenging air is automatically throttled by means of a butterfly valve operated by a pneumatic motor which is actuated by a Bristol control tied into the exhaust pipe temperature. Higher efficiency at partial loads results from this automatic control.

Lube oil is cleaned by two full flow purifiers using cellulose type filters. The auxiliary lube oil pump is used before and after service. This same pump is also automatically controlled while the engine is running and will start if the engine lube oil pump should fail. A central control and instrument panel was specified and furnished which included starting and indicating lights, flush mounted dial type pressure gages, exhaust pyrometer, crank case manometer, alarm panel, remote control push buttons with lights for fuel oil pump, and actuator oil

pump, barring gear switch and load limit control. The air intake filtering system employs circulating water and oil for summer operation. For winter use oil only is used as a cleaner. This method of cooling and cleaning reduces air temperatures considerably in warm weather. A radiator type intercooler is installed after the scavenging air blower to cool the intake air in summer. Water from the raw water pump is used for the cooling agent.

With the exception of a $75,000 revenue bond issue used to supplement cash on hand, Fredonia does not have any outstanding indebtedness against its power and light plant. The cash on hand at the time of the engine purchase was an accumulation of net revenues collected. In addition moneys were transferred from light plant earnings to augment other city funds whose principal source of revenue is from taxation. The power and light is furnished and maintained by the light department free of any charges to the municipally owned water plant, sewage disposal plant, street lighting, fire department, office, cemetery, shops, police department, library, parks, and ball park.

List of Equipment

Engine—Two-cycle 12-cyl. radial Duafuel, Nordberg.
Generator—Ideal Electric.
Exciter—Ideal Electric.
Gear Case—Nordberg.
Governor—Marquette.
Force feed lubricator—Manzel.
Scavenging blower—Roots-Connersville.
Jacket water cooler—Graham.
Lube oil cooler—Graham.
Inter-cooler (scavenging air)—Young.
Air filter—American Air Filter.
Lube oil filter—Winslow.
Fuel oil filter—Nugent.
Actuator oil strainer—Nugent.
Muffler—Burgess Manning.
Auxiliary lube oil pump—DeLaval.
Instrument panel—Nordberg.
Alarm system—Viking.
Pyrometer—Alnor.
Thermometer—Taylor.
Bristol control—Bristol.
Pressure switches—Allen Bradley.
Switch gear—General Electric.

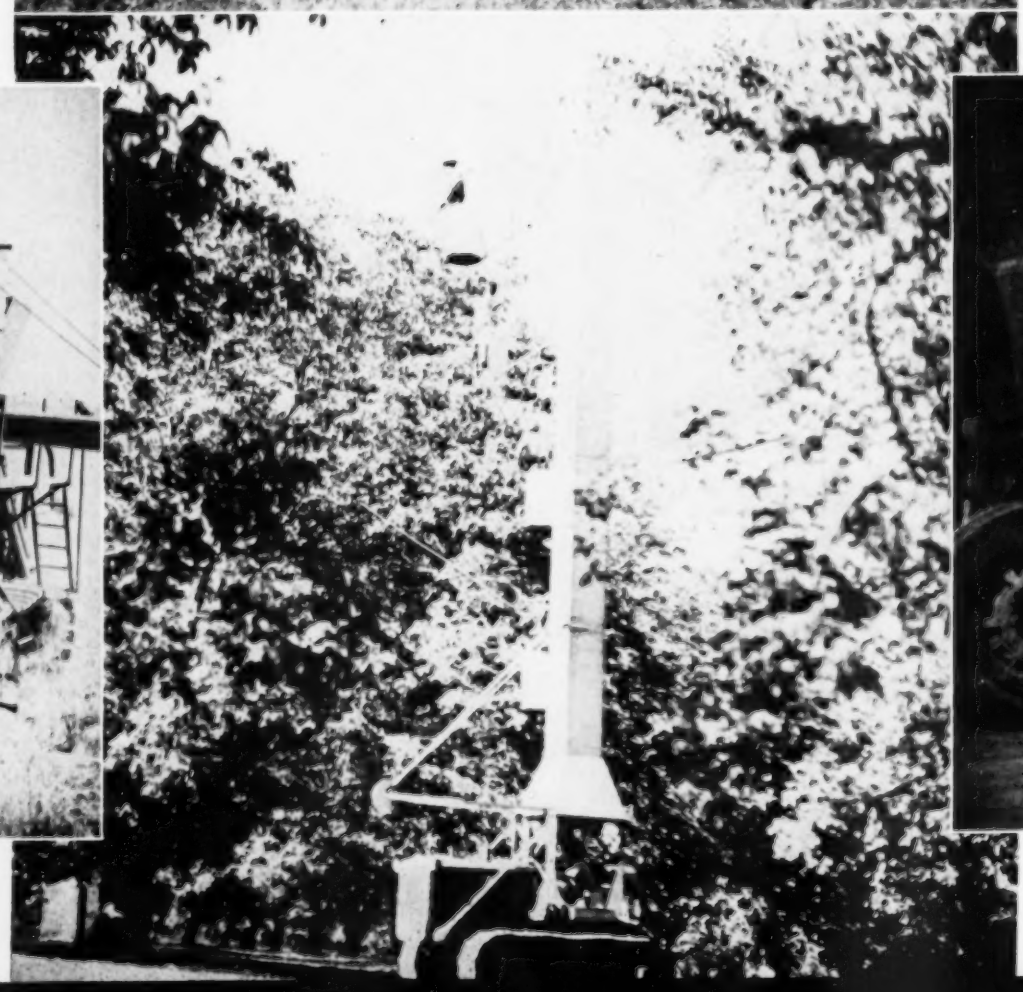
Power plant exterior showing Burgess Manning muffler and American cycoil intake air filter.

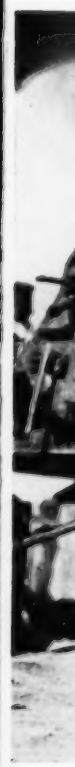
Sub base of Nordberg Radial engine houses the 1500 kw. Ideal generator. The foundation required only 27 yards of reinforced concrete.

DIESEL HARVEST CUTS RANCH COSTS

By F. HAL HIGGINS

HISTORICALLY, the farmer gets the first boot after every war. He responds with an all-out effort to produce more food and fiber with less man labor, longer hours and more machine methods with each war demand of his government. The Civil War brought in and put over the grain binder and threshing machine across the U. S. The Spanish-American was a small war with little demand in labor but it gave the farmer an upswing in prices that encouraged increased acreage to





Right, top: **An Allis-Chalmers HD 14 with Detroit Diesel Div. engine pulling a Mar-Beet sugar beet harvester.**

Right, center: **International diesel tractors pull a fleet of trailers loaded with alfalfa. Fast transportation to the driers is necessary to save the carotene content of the alfalfa.**

Right, bottom: **Knockers stand in oil drums on side of 50-ft. tower as the diesel tractor circles the big walnut trees. Men with flails clear trees of nuts.**

Below: **Over 60 of these two GM diesel engine one-man rice combines are owned and operated in the Sacramento Valley.**

wheat and meat. World War I put over the farm tractor for the average farmer. World War II stepped up mechanization trends on all crops, many that had not heretofore been mechanized beyond hand tools like hoe, pitch fork and scoop shovel. Also, the trend to combining several jobs to be done by one machine operator at one pass gained by leaps and bounds.

In between these periods came the pressures that put over many sharp cost-cutting machine economies that have lifted the nation to its No. 1 spot in history by elimination of hunger from the national consciousness for the first time it had been achieved by a nation. Rubber tires on wheel tractors and farm machines came in with the long depression of the 1930's that followed World War I's big boom. Along with air tires, running neck and neck for the top spot in the economic adjustment of farm practices, the diesel tractor arrived. It was a big crawler job with the West getting the biggest advantage as far as the U.S. was concerned. But today, as the farm problem again rises on the political horizon to plague politicians with both rural and industrial vote blocks, the farmer is again shifting crops, adopting new methods and machines, and the diesel tractor is going over in a big sweep across the whole wheel picture as well as going deeper into crawler models to the small sizes.

The grain and rice crops have developed side by side with much the same machinery up to airplane sowing of the crop. Both use the big crawler tractors with diesels of GMC, International Harvester, Buda, Hercules and Caterpillar. The International and Caterpillar diesel engines are built by and power the tractors manufactured by those companies. Oliver Corporation, which bought Cleveland Tractor Co. at end of World War II, uses Hercules. There are now plenty of wheel diesels of International, Allis-Chalmers, Case, Deere, Massey-Harris, Oliver, Minneapolis-Moline, and even Ford now coming in from England. The diesel trend all the way down to garden size is definitely on as competition sharpens and farmers figure their way out of their dilemma.

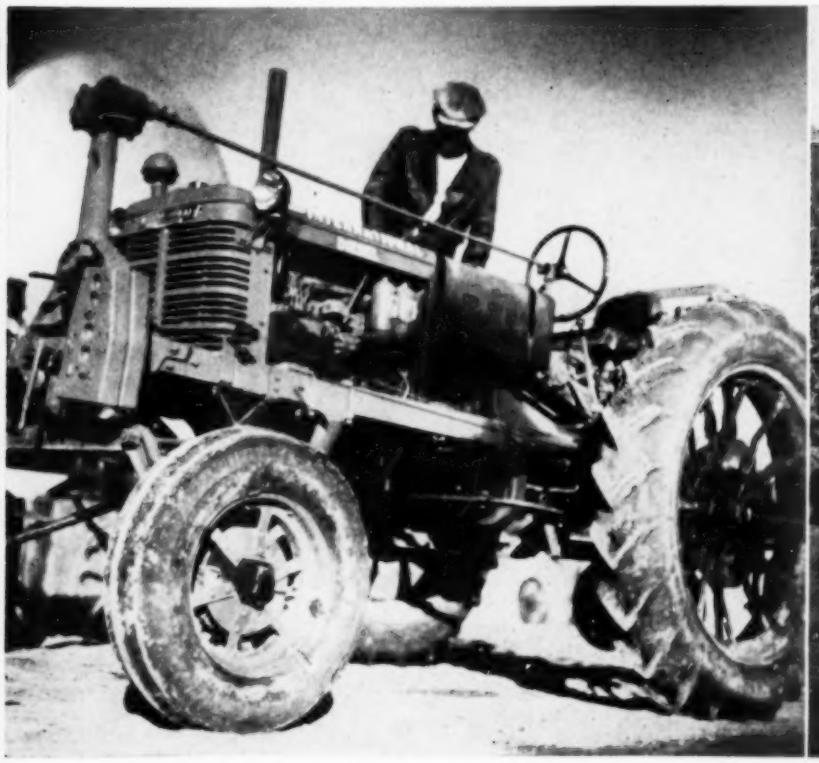
Check-ups by the writer with branch manager W. F. Carey of Case; vice-president Myers of Massey-Harris; west coast manager A. W. Thompson of Oliver Corporation; officials in California and Arizona branches of International Harvester, Deere & Co., Minneapolis-Moline, Ford Dearborn and Allis-Chalmers show a unanimous opinion that the diesel is getting a big demand from farmers in the middle and lower acreage operations to compel a big shift in the manufacture of farm tractors on wheels in the West.

Briefly, the demand is based on these reasons for more diesel farm power: 1. Cost cutting by reducing amount and price of tractor fuel. 2. Elimination of leakage of fuel from both tractor and supply tanks via employees and passers-by who help help themselves to gasoline for their own cars and light trucks. 3. Fire proofing the equipment and housing because diesel fuel does not burn when careless smokers drop stubs of matches and cigarettes. 4. With all the big ranch operations already equipped with crawler tractors burning diesel fuel, making all tractors and engine-powered combines, corn pickers, etc., dieselization smoothes operations while cutting fuel storage problems. 5. The good farmers who have been using diesel tractors and followed factory and dealer instructions have found they have less loss of time and expense from diesel tractors than they had from their gas tractors because the diesels had so many bugs and troubles to iron out at the outset that factories gave their dealers and factory service men much more careful training and taught them to pass on this accuracy in following service directions.

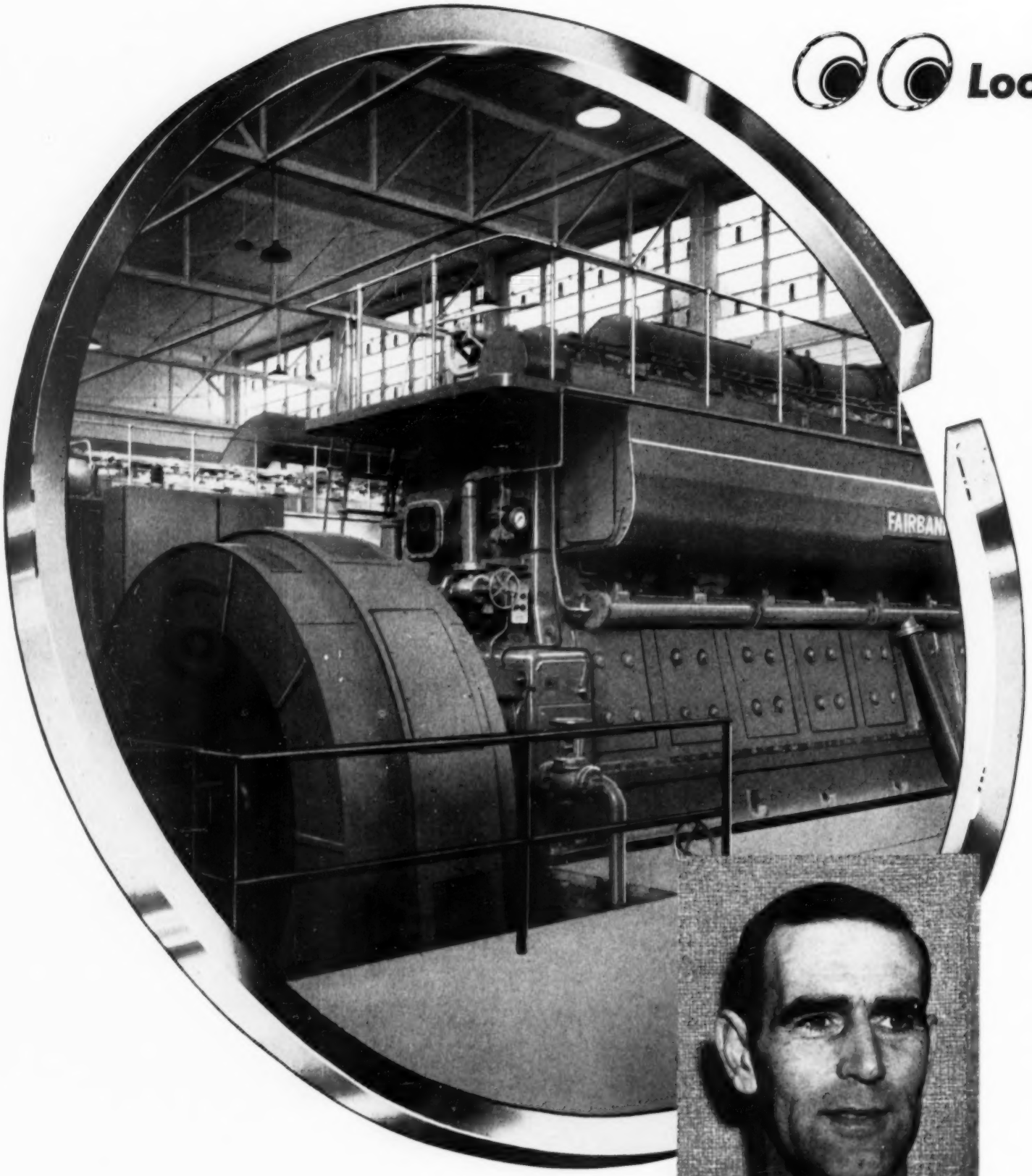
Harvests by diesels noted on the west coast this past year by the writer where new ideas and machines were being introduced were found in apples, almonds, walnuts, lettuce, sugar beets, wheat, rice, potatoes, corn, cotton, grapes, alfalfa, beans, etc. The California rice harvest, for example, probably leads the world in efficient food production per man. All the leading rice growers of the Sacramento Valley own and operate from one to fleets of four dieselized self-propelled combines in which a pair of GMC diesel engines of 65 horsepower make their success possible. The big Cat D8 tracks on which they are mounted permit one man to operate the machine for bulk harvest in spite of wet weather that frequently bogs all other machines at harvest time in October-November. They have cut the harvest period in half and insured a higher quality crop than was possible in the old pull harvester days when wet falls frequently dragged the harvest out for three or four months and lost as much as 15% of the crop with a lowering of the grade and price for much of the crop that was harvested.

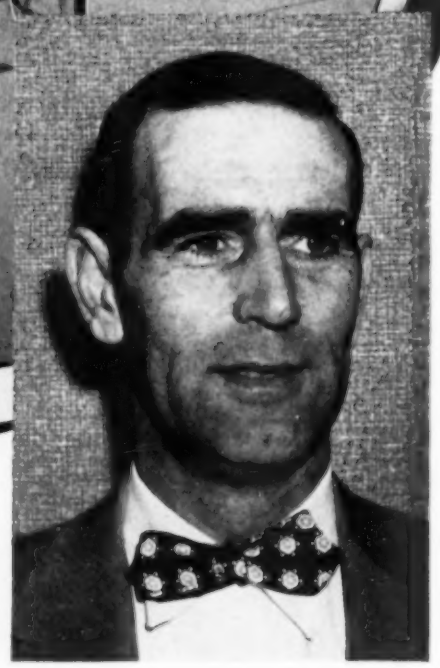
But the chopping of the troublesome and tough cotton stalks into the soil for mulch after harvest is being solved by diesel tractors pulling stalk cutters that chop into small pieces and hash them into the soil as mulch while eliminating hiding places for crop pests. Bulk harvest and handling of grapes for wine and raisins is also here. Ditto for the elimination of ladders from orchard crops with diesel tractors carrying towers from which men with long poles flail off walnuts. Almonds, prunes, dates and other tree crops are also being mechanized with tractors as the moving power for towers, pick-up harvesters, platforms, etc. The pictures tell a dramatic story of the trend to mechanizing with diesels moving in rapidly to replace the old gasoline engines that have dominated the farm scene since World War I.

International diesel tractor being filled with Standard Oil of California fuel at Frank King's ranch headquarters north of Woodland as asparagus harvest gets under way.



Cribari, big wine maker, harvesting from one of their many vineyards in the San Joaquin Valley. Photo was taken as a delivery of Texaco products was being made.





Mr. John N. Keen,
Assistant Manager,
Wolverine Electric Cooperative

to COOK for Better Rings!

WOLVERINE'S Award-Winning REA Plant Uses COOK PISTON RINGS!

Still the champion! In 1953 — for the second year in a row — these three 3500-HP Diesels helped win Diesel Progress Magazine's Award for Wolverine Electric Cooperative's Johnson plant as *"the most efficiently operated of all REA internal combustion plants in the nation"!*

All three engines are equipped with Cook Piston Rings. In 1953, each unit averaged 6,613 operating hours, and generated an average of 11,660,167 kilowatt hours. Maintenance costs for all three engines came to less than $300 for materials, and less than 800 man hours — most of it to secure maximum control of the fuel-oil injection system!

Here's what Mr. John N. Keen, Wolverine Electric Cooperative's Assistant Manager, has to say about Cook Piston Rings:

> *"We are well satisfied with our Cook Piston Rings. We feel we have excellent lube oil control, as well as a minimum of cylinder wear.* WITH ALMOST 14,000 OPERATING HOURS BEHIND THEM, THE CYLINDER LINERS ARE STILL IN VERY GOOD CONDITION. . . "

Mail coupon today for product information and name of your nearby Cook representative. C. Lee Cook Mfg. Co., Inc., Louisville 3, Kentucky.

TENSION THAT NEVER WEARS OUT!

Cook Piston Rings are tensioned on a Cook-designed machine which accurately controls the amount and distribution of tension. This exclusive process gently "squeezes" tension into the rings, with a series of small indentations—avoids harmful disarrangement of the rings' molecular structure. *The result is constant, uniform tension that never wears out!*

C. LEE COOK MANUFACTURING CO.

Sealing Pressures Since 1888

C. Lee Cook Manufacturing Co. — Dept. DPR-54
916 South 8th Street
Louisville 3, Kentucky

Gentlemen: Please send me complete information on Cook Piston Rings and name of nearest representative.

Firm_____

Street_____

City_____ State_____

Attention:_____

Type of Units_____

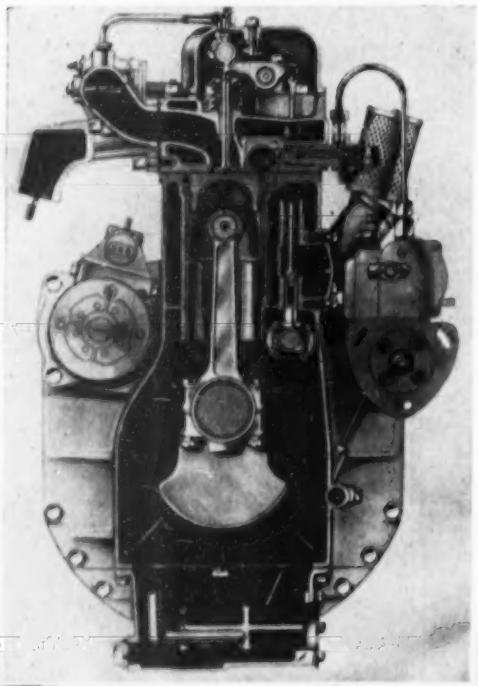
WHAT'S GOING ON IN ENGLAND

CONDUCTED BY **HAMISH FERGUSON**

Hamish Ferguson received his training and early experience with the English Electric Company. Subsequently, he spent a number of years with a firm of diesel engine consultants, London, and in 1944 became secretary to the Diesel Engine Users Association. In 1953, he relinquished his appointment to devote his time to private consulting work connected with diesels and gas turbines.

A SMALL DIESEL FOR AUTOMOBILE APPLICATION

THE Standard Motor Company Ltd. of Coventry has for some time been building a light four-cylinder diesel engine whose primary use was for the Ferguson Tractor. More than 30,000 of these engines have now been produced and during the last two years a considerable number of London's taxi-cabs have ben fitted with the diesel. Following the success of this experiment it was decided to extend to the field of the private car and the new range is now in production.

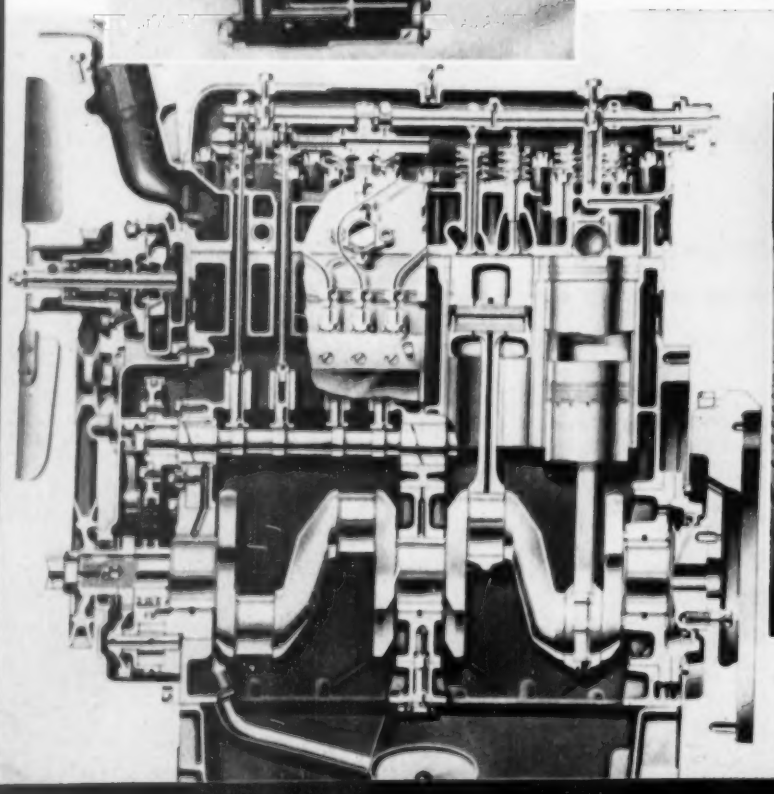


In outward appearance the engine is pleasing to the eye, being clean and neat with no undue external pipes and other additions beyond the essential starter motor, dynamo, C.A.V. fuel pump and Purolator oil filter. The good balance and smooth delivery of torque which is characteristic of this engine are due to sound mechanical design and the use of the Freeman-Sanders design of combustion chamber. In this system, fuel is injected by a pintle type C.A.V. atomiser into a spherical combustion chamber in the cylinder head, which in turn opens directly above a crescent-shaped air cell machined into the cylinder block. The combination of these two chambers, together with the positioning of the injector, gives a good fuel economy over the full working range of the engine and reduces the well-known characteristic of "diesel knock" particularly at normal speeds.

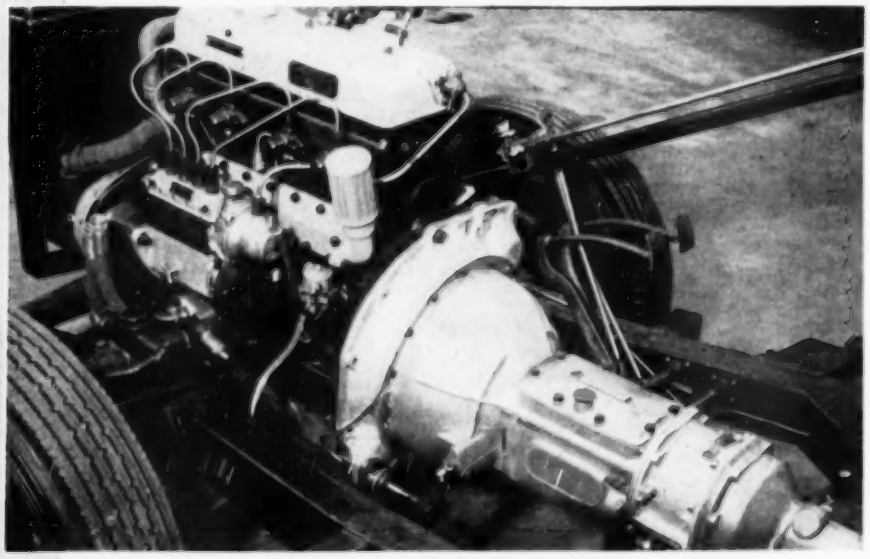
Two cross-section views of the Standard Motor Company's 4-cylinder diesel for automobile application.

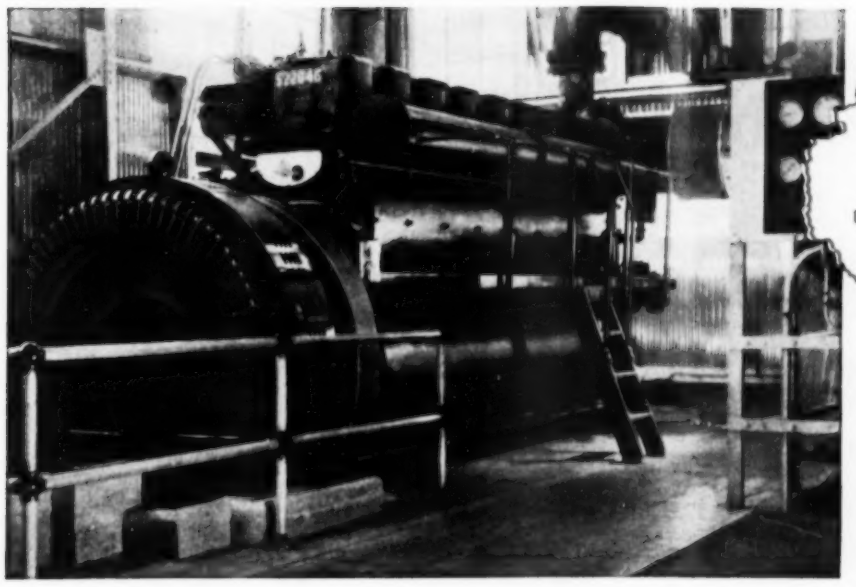
The layout of the engine departs from the conventional lines to provide adequate strength for a three-bearing crankshaft which is carried in barrel-type housings in the integral cylinder block and crankcase casting. A patented arrangement at the top of the slip-fit centrifugally-cast dry cylinder liners controls the build-up of carbon on the piston land above the top compression ring. It consists of two cuff rings, the lower of which has an internal diameter slightly smaller than that of the cylinder bore. It is made of hard heat-resisting chromium iron. In service this ring scrapes off any deposition of carbon on the top piston land, so preventing cylinder bore scoring. The upper ring has a cut-out portion which forms parts of the crescent-shaped air cell previously mentioned. The overhead valves are pushrod-operated from a three-bearing camshaft on the left of the engine. Mounted directly above the exhaust valve rockers is a spindle carrying the decompressor cams.

The governor is of the pneumatic type and basically consists of a pitot tube tapped from the engine side of the throttle in the air manifold. This tube connects to a chamber on the C.A.V. pump, the chamber having a diaphragm which is spring loaded to full throttle position. Depression in the air manifold caused by part throttle opening moves the diaphragm against its spring and so moves a rack



The same engine mounted in the standard automobile chassis.





this eight-cylinder, 1080-hp Alco Diesel Engine delivers dependable, round-the-clock power to a large bauxite mining center and its community.

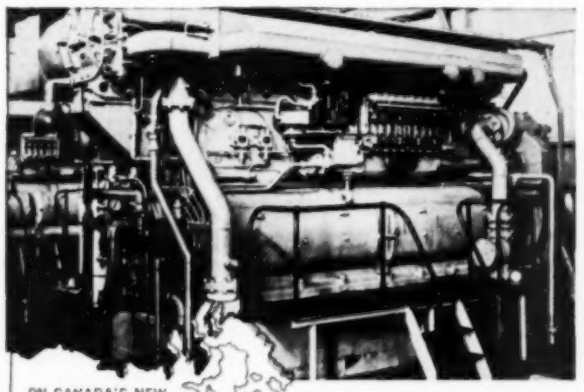
THE STORY GETS AROUND

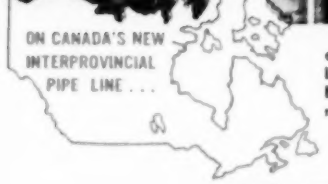
Make a better product and the story gets around.

The story of Alco Diesel Engines, for example, has traveled around the entire world—right along with the engines themselves. High points in the story are:

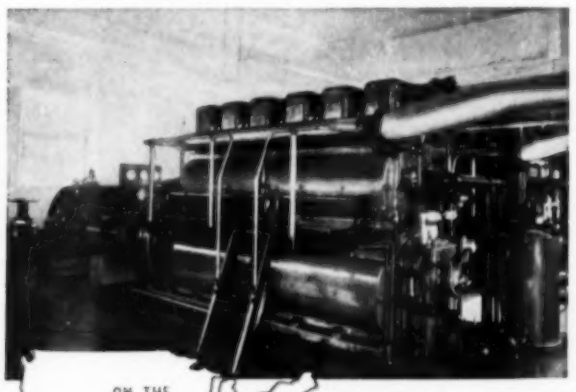
- ☆ **COMPACT DESIGN—saves floor space, cuts construction costs.**
- ☆ **HIGH ENGINE EFFICIENCY—for lower fuel costs.**
- ☆ **FLEXIBLE POWER RANGE—for lower expansion costs.**
- ☆ **MEDIUM SPEED—for lower auxiliary equipment costs.**
- ☆ **HANDLES ANY TYPE OF JOB—continuous or standby, temporary or permanent.**

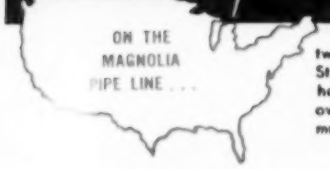
Your nearest Alco sales representative will be happy to give you complete details. (For information on the new, heavy-duty lightweight Model 251A, ask for Bulletin DE-2.) Sales offices in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady and St. Louis.





and its American subsidiary, Lakehead Pipe Line, Alco Diesel Engines pump Alberta oil 1137 miles to U. S. port on Great Lakes.





two Alco Diesel Engines at Anthony Station, near Muncie, Indiana, have run 89.6% of elapsed time over an 11-year period—and as much as 94.9% in a single year.

ALCO DIESELS

AMERICAN LOCOMOTIVE COMPANY

SCHENECTADY, N. Y.

which in turn rotates the injector plungers. The relative position of the helical groove in each plunger to a fuel relief port in each plunger barrel regulates the amount of fuel pumped into each cylinder. The combination of venturi size in the air manifold, throttle stop position and strength of diaphragm spring regulates the top governed speed of the engine. Included in the throttle control linkage is a lever controlling cam, which in turn positions a spring-loaded stop. As more "rack" is required at idling speed than at full throttle light load, the cam-controlled stop is only brought into operation at idling speed.

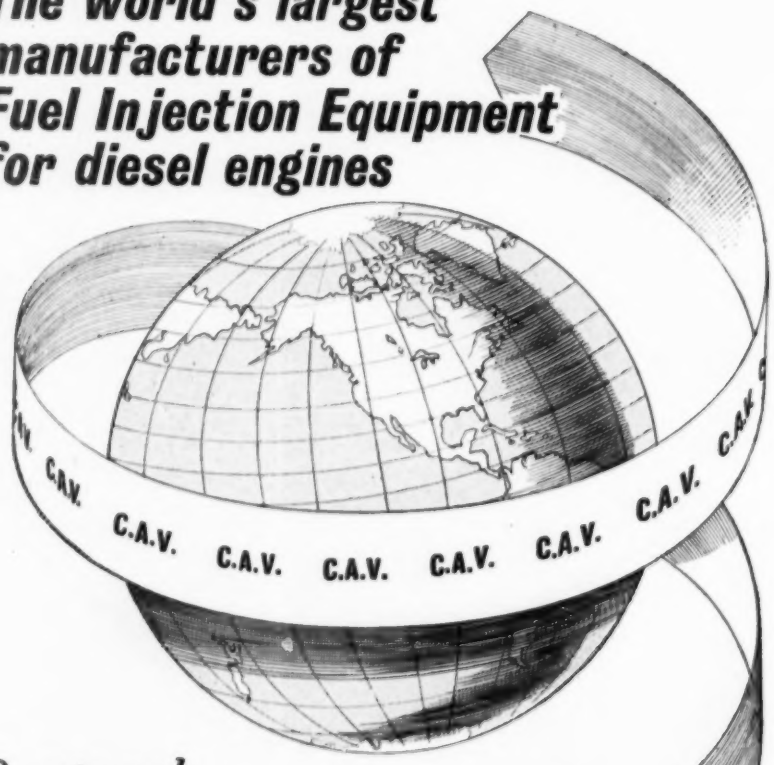
Lubrication is by Hobourn-Eaton eccentric rotor pump driven at engine speed by helical gears from the crankshaft. This type of pump has a high hydraulic efficiency besides having the virtue of being simple in design. For tractor use the engine is governed at 2,000 rpm. at which speed 28 bhp. is developed; for automobile use various modifications are made and the engine develops 40 bhp. at 3,000 rpm. The engine has a capacity of 2,092 cc., with a bore and stroke of $3\frac{3}{16}$ in. and 4 in. (80.96 mm. x 101 mm.). The maximum torque developed is 1,010 lb. in. at 1,050 rpm. at which speed the brake specific fuel consumption is 0.4 pt/bhp/hr. The compression ratio is 17:1. Overall dimensions are as follows: Length (fan to clutch face), 28 in.; width, $21\frac{1}{2}$ in. and depth, 27 in.

The chief stimulus for the production of a diesel car lay in the potential saving in fuel costs. It should be appreciated that in England the relative costs of petrol and diesel oil, including tax, are of the order of 4/$3\frac{1}{2}$d and 4/1d respectively, so that the vehicle which can show the highest mpg. has a distinct advantage where running costs are concerned. Results obtained from a fleet of London taxi-cabs, taken over a considerable mileage, show that fuel consumption was 32 mpg. with diesels as compared with only 17 mph. on petrol engines. The saving on fuel alone was $1\frac{1}{2}$d per mile.

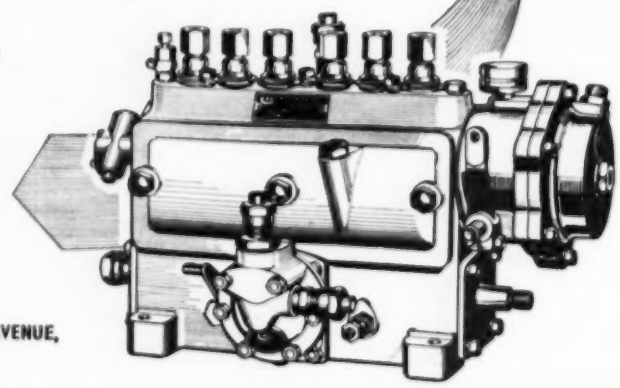
For the private car doing normal work a consumption of 40 to 45 mpg. would be expected and this again would be about double the distance as compared with the equivalent petrol-driven car. Inevitably the diesel is heavier than the petrol engine, being 539 lbs. as against 442 lbs., and the first cost of the diesel is higher. However, this extra cost would be compensated by the saving of fuel in a comparatively short time and there is no doubt that the diesel engine will have a much longer life than the petrol engine and maintenance should be lower.

C.A.V.

The world's largest manufacturers of Fuel Injection Equipment for diesel engines



Depots and Service Agents in over 100 countries



C.A.V. DIVISION OF LUCAS ELECTRICAL SERVICES INC.,
653, TENTH AVENUE,
NEW YORK 19, N.Y.
Sales Office: 14820 DETROIT AVENUE, CLEVELAND 7, OHIO.

C.A.V. Fuel Injection and Electrical Equipment

Small Water De-Mineralizer

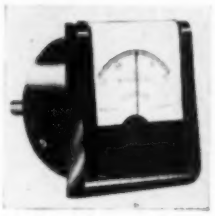
The LaMotte Chemical Products Company has developed a small water de-mineralizer which produces chemically pure water for batteries or other such uses. Known as the "Min-X," the unit is a double-acting de-mineralizer of non-breakable construction employing high capacity resin filters for the production of chemically pure water equal to triple distilled water. The maker states that the action of the "Min-X" increases the efficiency of the filtering operation to a considerable extent.

The total weight of the unit is 4 ounces. It comes in three parts, the bulb, the tube and the tip. In all, it has a total length of $7\frac{1}{4}$ inches. The contents of the tube turns brown when a refill is required. Inserting the new tube is a matter of a few seconds. Further information on this handy water de-mineralizer may be obtained from the company, Towson 4, Baltimore, Maryland.

Awarded Contract

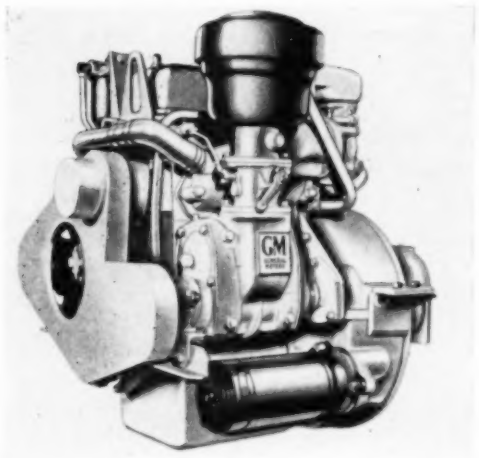
The Hamilton (Ohio) Division of the Baldwin-Lima-Hamilton Corporation has been awarded a contract from the City of Edmundston, New Brunswick, Canada, for a diesel generating unit. The Hamilton two cycle, slow speed, heavy duty engine will be rated 2,400 bhp. or 1,700 kw. at 257 rpm. and will have five cylinders, a $21\frac{1}{2}$ in. bore and $27\frac{1}{2}$ in. stroke. Considerable savings to the city are anticipated with the use of 100% #(6) oil (Bunker "C" oil) in the engine. Installation will be made sometime during 1954.

New Addition to Burlington Instrument Line



A new plexiglass front 2½ in. square semi-flush model instrument is the newest addition to the Burlington Instrument line. Since the entire front case is molded of plexiglass it can be furnished absolutely clear, thus giving a view of the instrument movement, which is sometimes desired for certain scientific or medical applications. The large square window which slopes backwards at a slight angle together with the decorative vertical ribbing on the lower part of the cover have been designed to harmonize with modern trends in industrial design. The rim and lower third of the case may be spray lacquered in any color desired with a variety of surfaces, from glossy, through flat finishes, to dull mat finishes. These instruments are available with both dc. or ac. movements, also as rectifier type instruments, for VU and DB indicators and ac. voltmeters. Thermocouple RF milliammeters utilizing an internal thermocouple are available in the same model. For further particulars on this new Model 721, 2½ in. square plexiglass front instrument write to Burlington Instrument Company, 151 North Third Street, Burlington, Iowa.

New 35 Hp. Marine Diesel Is Introduced



A new 35-hp. marine diesel designed for use as auxiliary and main propulsion power on sailing yachts and small craft has been announced by the Detroit Diesel Engine Division of General Motors. The engine, the latest addition to the Division's line of Series 51 valveless, small-boat diesels is 21¾ inches in height from the crankshaft to the top of the engine. It is 27½ inches wide and has an overall length with 2:1 gear ratio of 52¼ inches. It has two cylinders arranged in line and develops its rated shaft horsepower at 2200 rpm. Its continuous rating at 2200 rpm. is 28 shp.

It has all the simplicity features of the four-cylinder "51" introduced by Detroit Diesel last year and like all GM diesels is a two-cycle engine. Bore and stroke are both 4.1 inches and it has a total displacement of 108.3 cubic inches. Standard equipment includes fresh-water cooling. The engine is available with direct drive and with 1.5 and 2 to 1 gear ratios in either right- or left-hand rotation.

General European Manager

S. Riley Williams, Worthington Corporation vice president in charge of foreign business, announced the appointment of B. R. McBath as general European manager. Mr. McBath will headquarter at the French-Worthington Company, Paris, France offices. A graduate of the University of Tennessee with a BS. degree in engineering, Mr. McBath joined Worthington Corporation, Harrison Works, in February 1928 where he served for 20 years in charge of various engineering activities and as chief engineer of Research and Development Department. Prior to his leaving Worthington Corporation in 1949 to serve as vice president of the U. S. Hoffman Manufacturing Corp., Syracuse, N. Y., Mr. McBath held the post of Worthington Corporation Plainfield works manager. In 1953, Mr. McBath returned to Worthington Corporation as assistant to vice president in charge of manufacturing and previous to his present appointment, he was acting manager of the new Worthington Decatur, Alabama plant.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

PROTECTED

right from the start

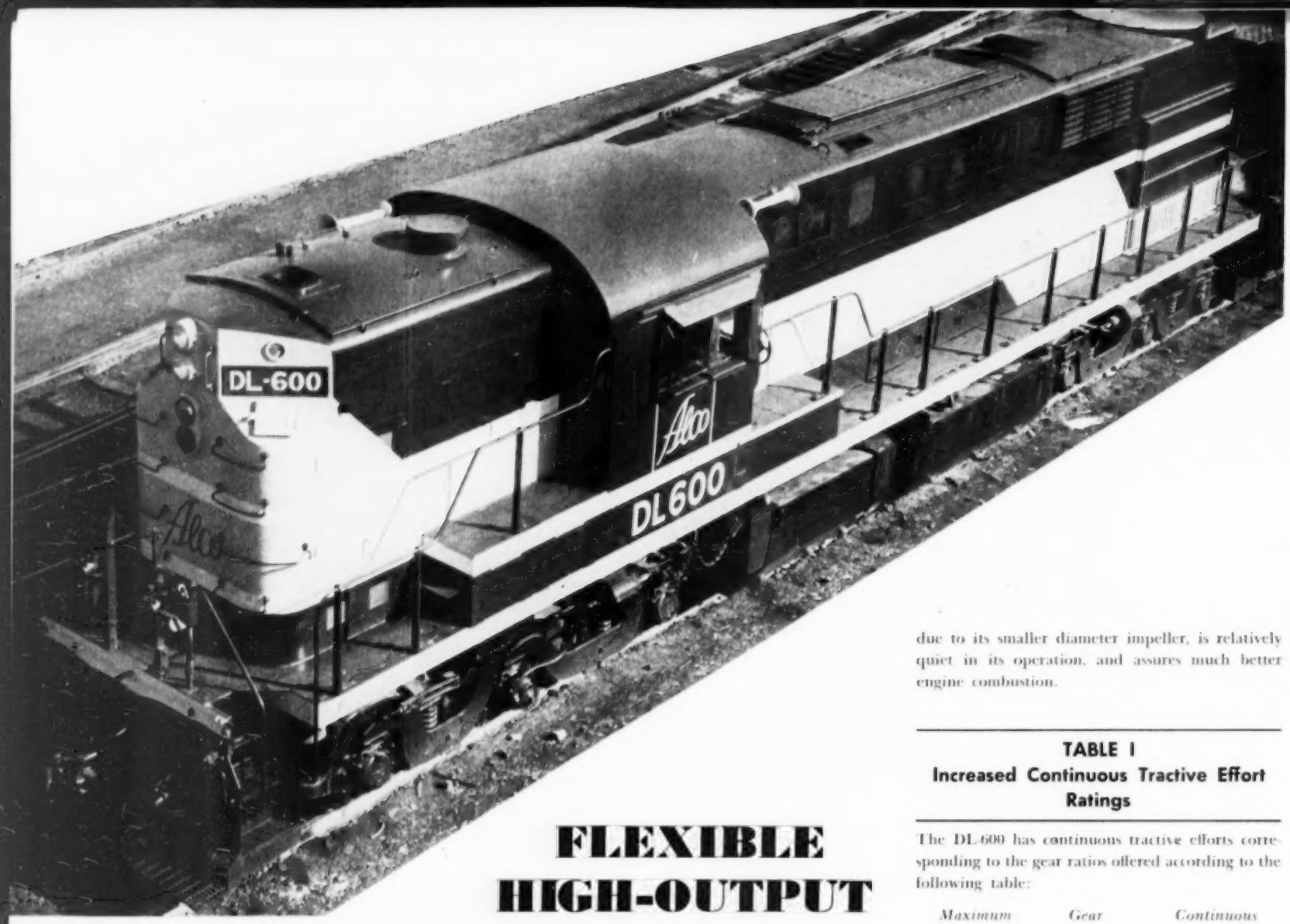
Starting time is toughest for engines, too. That's when they really need protection. When the lube oil is cold and viscous many filters won't accept it . . . send it through the by-pass without any filtration. Then, if the oil has been contaminated, or any part of the engine fails, there is no protection for critical surfaces. The power plant goes down . . . and repair costs go up.

You can use Winslow full-flow filters with complete assurance that oil will be filtered . . . Hot or Cold . . . right from the start. Winslow's exclusive CP* design provides automatic pressure regulation within the element, so that oil is by-passed only under emergency conditions. CP construction gives greater porosity near the outer edge, so that large particles are trapped first. Smaller contaminants are removed as the oil passes through denser filtering media near the center. This progressive filtration is clearly superior to any element that traps all sizes of particles on the outer surface, which becomes clogged and reduces the capacity of the filter.

*CP is the title of a helpful and informative booklet available from Winslow Engineering Company. Why not write today for your copy?

WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California



FLEXIBLE HIGH-OUTPUT LOCOMOTIVE

A new, high-output diesel-electric locomotive, designed for flexibility in handling all types of rail service, has been introduced by the American Locomotive Company. Dubbed the DL-600, this latest addition to Alco's diesel line is a 6-motor unit conservatively rated at 2250 hp. It has the highest continuous and short-time tractive ratings of any diesel locomotive on the rails. A hood-type unit, the DL-600 differs in outward appearance from Alco-built road switchers since its front and rear hoods are the same height as its cab. Even though it is a large locomotive, the new diesel presents a long, sleek look because of its even hood and cab roof line and low running boards.

The new heavy-duty all-purpose locomotive is an extremely versatile unit. Built for high speed, main-line freight or passenger assignments, the locomotive is also designed for slow speed, heavy drag service and is equally at home on medium speed local freight runs or yard transfer and switching asignments. Power for the DL-600 is furnished by the improved Alco Model 244 Vee-type diesel engine which has operated in thousands of road locomotives throughout the world since 1946. The engine is conservatively rated at 2250 hp. and the cylinders have a 9-inch bore and 10½-inch stroke and a full load speed of 1000 rpm. Engine starting is effected by using the main generator as a motor, with current supplied by storage batteries. A gear-driven centrifugal pump circulates water through engine, radiators and lubricating oil cooler. Radiator inflow is controlled by a simplified modulated shutter control and by the variable speed of the 72 inch radiator fan, which is driven through an eddy current clutch for speed control. Engine intake air is ducted from carbody filters direct to the water-cooled turbocharger air intake. The high capacity of the cooling system keeps the oil and water temperatures down to conservative figures even at high ambients.

The outstanding flexibility of the DL-600 can be noted from the continuous tractive effort ratings shown right. The 360,000-lb. unit geared for 80-mph. maximum speeds provides continuous tractive effort equivalent to 18% adhesion. Thus heavy freight drags can be handled by a unit also capable of 80-mph. performance in passenger service. Where the heaviest freight movements are involved, the 390,000-lb. unit with 65-mph. gearing offers the highest continuous tractive effort available and may still operate in high-speed freight or average passenger service.

A new feature is the water-cooled turbosupercharging system which provides lower maintenance cost and more rugged construction than air-cooled supercharagers formerly used with this engine. The new turbo offers improved acceleration characteristics due to its smaller diameter impeller, is relatively quiet in its operation, and assures much better engine combustion.

TABLE I
Increased Continuous Tractive Effort Ratings

The DL-600 has continuous tractive efforts corresponding to the gear ratios offered according to the following table:

Maximum Speed	*Gear Ratio*	*Continuous Tractive Effort*
80 mph.	64-19	65,100 lbs.
75 mph.	65-18	69,800 lbs.
65 mph.	74-18	79,500 lbs.

TABLE II
ALCO DL-600 Condensed Specifications

Continuous tractive effort:	
65 mph. gearing	79,500 lb.
75 mph. gearing	69,800 lb.
80 mph. gearing	65,100 lb.
Short-time tractive effort	107,400 lb. for 1 min.
Starting tractive effort	97,500 lb. at 25% adhesion
Weight, maximum	390,000 lb.
Weight, minimum	325,000 lb.
Brakes	clasp type
Dynamic braking capacity	3400 hp. max.
Height, maximum	14 ft. 8⅜ in.
Width, maximum	10 ft. 1⅝ in.
Length, inside knuckles	66 ft. 5 in.
Diesel engine—ONE V-type 16-cylinder turbosupercharged	2250 hp.
Trucks	two 6-wheel, 3 motor
Wheel diameter	40 in.
Lube Oil	250 gal.
Fuel Oil	1350 gal.
Fuel oil, without boiler	2400 gal.
Engine cooling water	280 gal.
Sand	40 cu. ft.

Assistant Sales Manager

John E. Scoggan

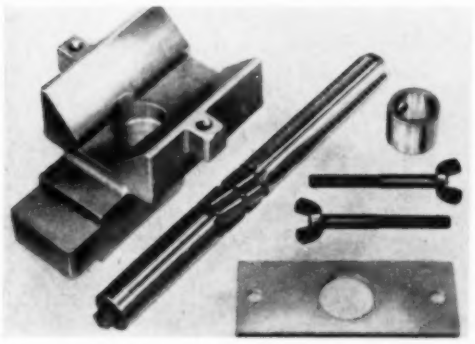
The appointment of John E. Scoggan as assistant sales manager of the C. Lee Cook Manufacturing Company of Louisville has been announced by Fred D. Durham, president of the company. Cook manufactures a diversified line of industrial piston rings and metallic rod packings. Mr. Scoggan formerly was in the firm's Engineering and Production Control departments. In the latter department, he was production manager.

Prior to joining the C. Lee Cook Company, Mr. Scoggan was with the Curtiss Wright Company as a blade design engineer. During World War II he served three years in the Air Force as a pilot. He is a graduate of Purdue University, and holds a BS. degree in Mechanical Engineering.

Superior Diesel Bulletin

National Superior PTDS supercharged diesel drilling engines are described in Bulletin 115 by The National Supply Company, Engine Division, Springfield, Ohio. Illustrations include cutaway views showing design features, dual fuel operation, and generator sets. Performance curves, dimensional diagrams, and specification tables on these 620 (continuous) BHP engines are included in this 16-page booklet.

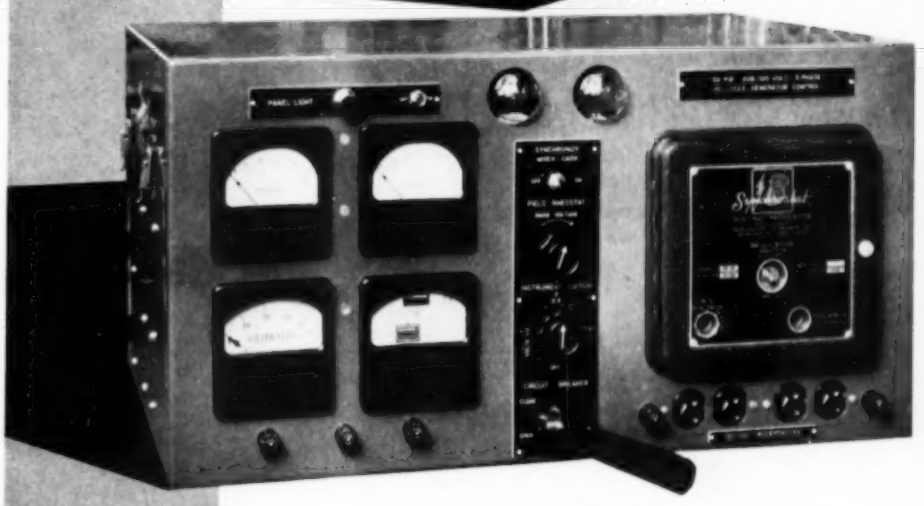
Piston Bushing Reamer Sets



A new series of piston bushing reamer sets for GM diesel engines, designed to remove excess stock from service bushings to factory specifications, is announced by Kent-Moore Organization, Inc., leading manufacturer of special automotive service tools and equipment. A special set has been developed for each of three GM diesel engine specifications . . . J 4970-A for Series 51's, J 3071-A for Series 71's and J 5131 for Model 6-110's. Each set includes the three tools required to quickly, accurately perform this necessary reaming operation . . . reaming fixture, two stage reamer, and guide bushing. The special reamers insure the proper fit of piston pin to bushing and the fixture insures alignment of the piston and pin to the connecting rod.

Literature and ordering information can be obtained, or the sets can be ordered direct from Kent-Moore Organization, 5-105 General Motors Bldg., Detroit 22, Michigan.

DIESEL DRIVEN GENERATOR CONTROLS
for Industrial or Military Applications



Typical unit control for generators of 15-150 KVA capacity with complete metering, regulating, synchronizing and protective devices.

LAKE SHORE can custom-engineer and build a variety of units in A. C. and D. C. types for engine generator manufacturers. Models for either portable or fixed installations can be furnished for industrial applications as well as to government specifications. Special constructions for arctic or tropical use also can be supplied.

LAKE SHORE diesel driven generator controls have capacities ranging from 10 to 250 KVA, 600 volts maximum.

Write for literature today.

1954-LS

Lake Shore

LAKE SHORE ELECTRIC CORPORATION
212 WILLIS STREET • BEDFORD, OHIO

ENGINEERS • DESIGNERS • FABRICATORS

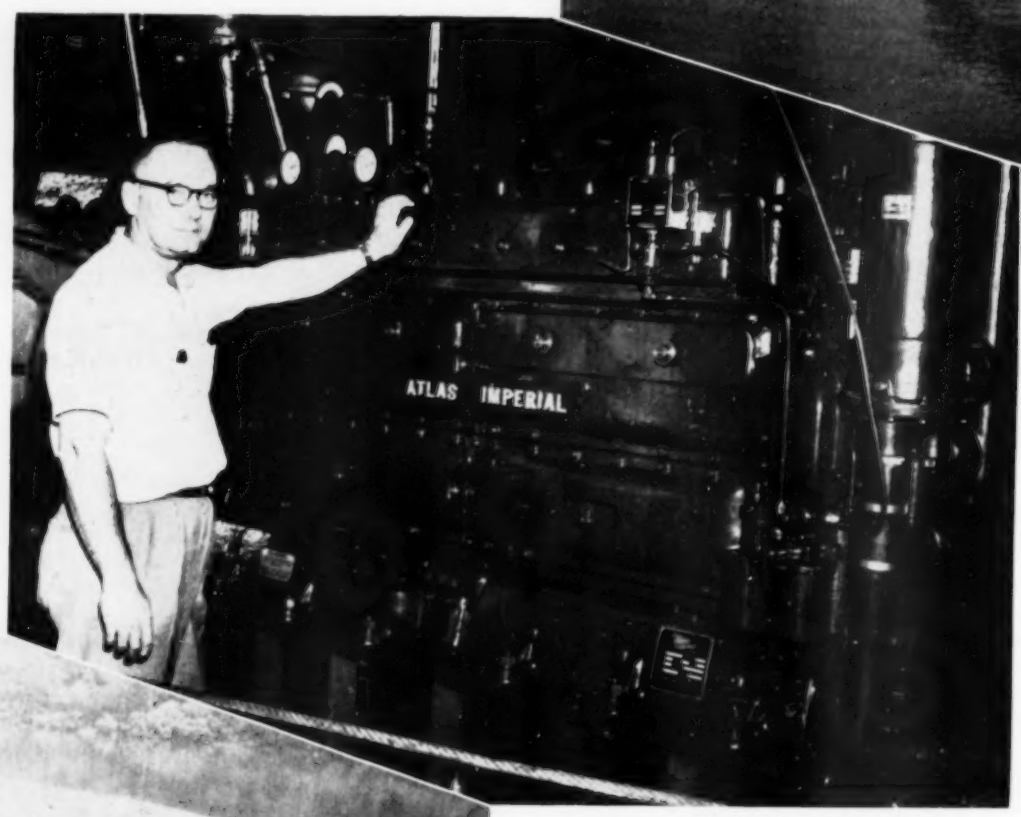
DIESEL DREDGING AT A PROFIT

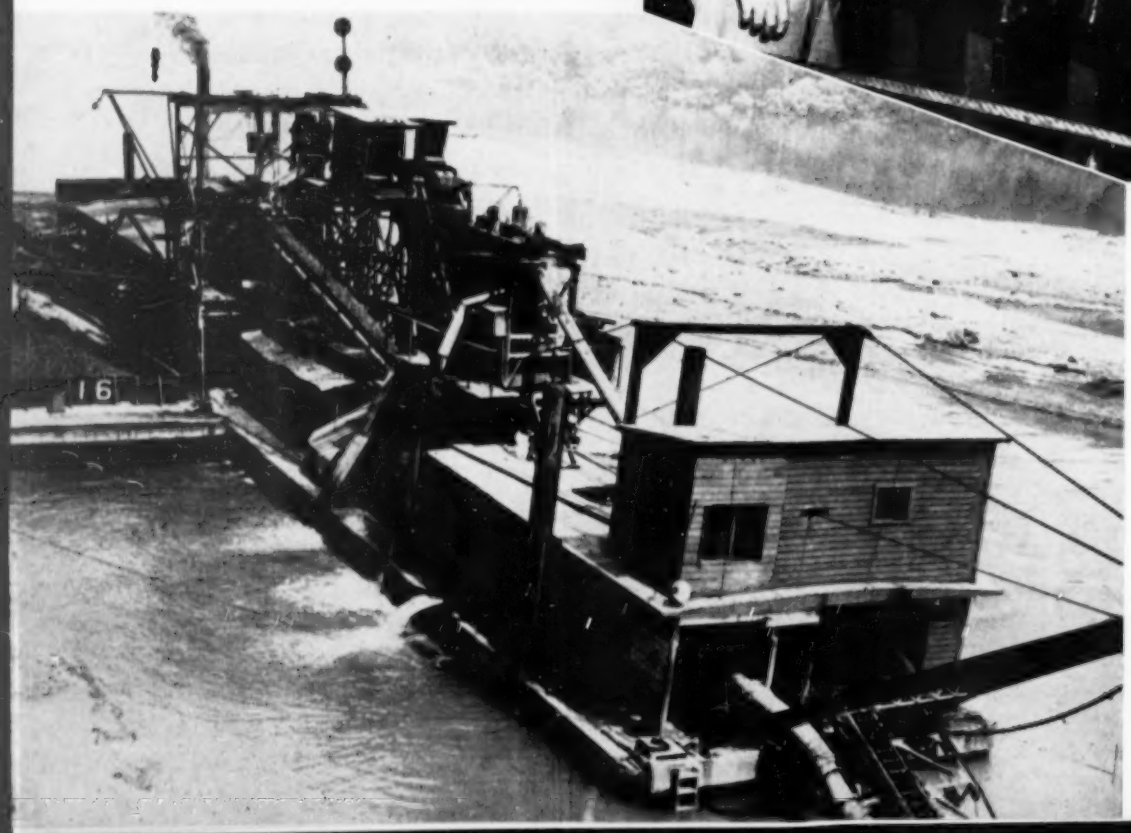
USE of diesel power to dredge river sand and gravel, and to move these products to customers, is paying off for the Ohio River Dredging Co., Huntington, West Virginia, at a time when many other sand and gravel suppliers find their profits squeezed by high operating costs. Operating two dieselized dredges and two dieselized towboats, with a group of 20 barges, the company obtains its materials at three different dredge sites and delivers them anywhere along the river from Greenup, Kentucky, to Gallipolis, Ohio. The company dredged and sold 250,000 tons of sand and gravel in 1952.

E. V. Rawn, president, and Edward Peel, superintendent, direct the company's activities from an operating office located on an 850-foot Ohio River frontage at the foot of 20th St. in Huntington. A selling affiliate, the Huntington Sand and Gravel Co., owned jointly by the Ohio River Dredging Co. and a neighboring company, handles all sales. Mr. Rawn spends considerable time with the selling affiliate and Mr. Peel coordinates the activities of the dredges and towboats. In its operations, the company utilizes four Superior diesels and one Atlas diesel, all manufactured by The National Supply Co. The Atlas Model 35, put in service June 9, 1953, performs so effortlessly that the operator's first comment was "I can't tell when the clutch is in!"

The company's three dredging sites total about two miles of river frontage, each site running back about 500 feet from the Ohio. A 22-foot glacial age gravel deposit, its top at the usual water level, underlies the 20 to 30 foot overburden of "bottom land." A steam-powered 3½ yard whirley crane is used to remove the soil from above the gravel and then to place it in position to maintain the river bank. The main dredge, operated by James Shamblin and a crew of five, has a capacity of 200 tons of finished product an hour. Sand and gravel is drawn hydraulically from the gravel deposit by means of a Thomas 12-inch outlet dredge pump. Washed and screened on the dredge, the material is delivered by conveyor to a waiting barge.

The Atlas engine, a Model 35-SX-6, turns a shaft with multiple sheaves for transmission of power through 12-V-belts to the Thomas pump. Designed



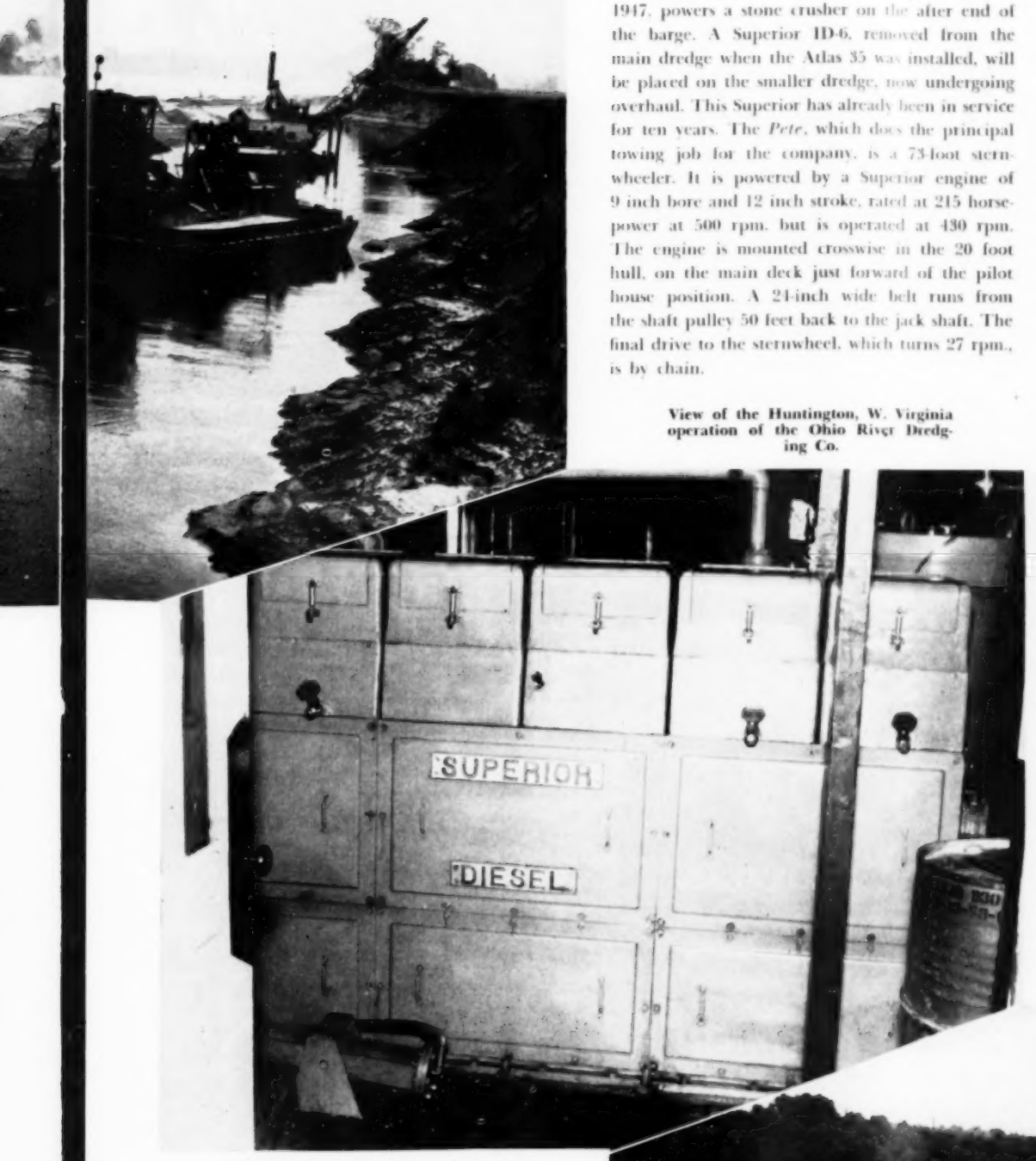


Left, the big dredge of the Ohio River Dredging Co. near Huntington, W. Virginia. Dredge hose in foreground leads from the water to the Thomas pump powered by the Atlas 35-SX-6 with Brown Boveri turbocharger. Above, Mr. E. V. Rawn, president of the company, is shown with the engine.

with a 6½-inch bore and 8¼-inch stroke, this turbocharged engine is rated at 300 horsepower at 1200 rpm. The pump, with a capacity of 9600 gallons a minute, operates at 390 rpm., drawing 270 horsepower from the engine at 1070 rpm. A shaft end sheave, or pulley, with V-belt, runs a 2-inch Gardner-Denver high pressure water pump that supplies water to keep the Thomas pump free from grit. Electric power for the big dredge is supplied by a Superior GDB-8 100 kilowatt

horsepower), the two large loading conveyor belts (4 horsepower), the sand bucket conveyor (25 horsepower), and the crushed stone conveyor (20 horsepower).

A Superior GBD-6 diesel engine, purchased in 1947, powers a stone crusher on the after end of the barge. A Superior ID-6, removed from the main dredge when the Atlas 35 was installed, will be placed on the smaller dredge, now undergoing overhaul. This Superior has already been in service for ten years. The *Pete*, which does the principal towing job for the company, is a 73-foot sternwheeler. It is powered by a Superior engine of 9 inch bore and 12 inch stroke, rated at 215 horsepower at 500 rpm. but is operated at 430 rpm. The engine is mounted crosswise in the 20 foot hull, on the main deck just forward of the pilot house position. A 24-inch wide belt runs from the shaft pulley 50 feet back to the jack shaft. The final drive to the sternwheel, which turns 27 rpm., is by chain.



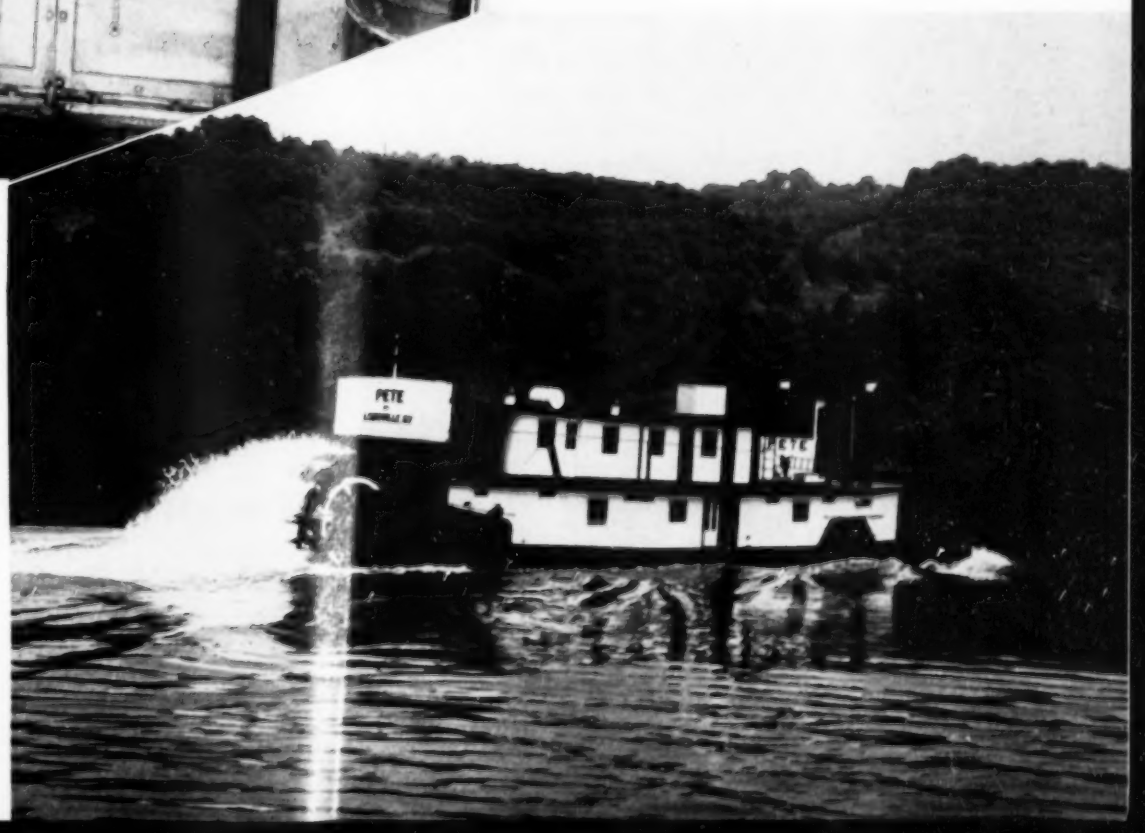
View of the Huntington, W. Virginia operation of the Ohio River Dredging Co.

This engine, which Captain J. W. Waldron reports to be a smooth performer, has been in use since 1941. Originally on the *Villanova*, operated out of Gloucester, Mass., it was removed in 1950 when the O'Hara fishing fleet was repowered with Superior engines of higher horsepower. It has been on the *Pete* since then. Mr. Rawn's father, also named E. V. Rawn, one of the country's pioneers in the production of river sand and gravel, bought the company's first Superior engine in 1937 for use on the *Tex*, a 50-foot sternwheeler. The *Tex* was sold in 1953. The company bought the *Pete*, which had been leased for 10 years, in 1948. Two years later, when time came to repower, only a Superior was considered. Equipment on the *Pete* includes a portable conveyor by means of which sand and gravel can be delivered for unloading at any riverfront spot the customer names. Made by Barber Greene Co., this 24-inch belt conveyor can handle 200 tons an hour. It has a maximum reach of 435 feet, provided by three 60-foot stackers, one 45-foot stacker, and 210 feet of portable frame. The conveyor is gasoline powered.

In addition to Captain Waldron, three crew members and a cook make up the complement usually aboard. Sleeping quarters are available, but are seldom used because most of the towing runs are completed in a day.

List of Equipment on Main Dredge

Diesel engine—Atlas Model 35-SX-6. The National Supply Co.
Turbocharger—Brown-Boveri.
Engine drive couping—Falk.
Power take-off clutch—Twin Disc.
Air filter—Air Maze.
Starting air compressor—Quincy.
Temperature controls—Fulton Sylphon Co.
Lube oil strainer—Winslow Co.
Engine hour meter—Barbour Stockwell Co.
Lube oil cooler—Kewanee Ross.
Heat exchanger, surge tank, and thermostat—Kewanee Ross.



Right, the *Pete*, principal towboat of the Ohio River Dredging Co. heading to Gallipollis, Ohio. The craft is powered by a Superior diesel, above, rated at 215 hp. at 500 rpm. It has a bore of 9-in. and a stroke of 12-in. This engine has been in service since 1941, originally powering a fishing boat out of Gloucester, Mass.

generating set, now rounding out its eighth year of trouble-free service. A 40 horsepower electric motor drives the continuous chain scoop cutting head, which loosens gravel to be picked up by the pump hose. The hoist for the cutting head and hose use another 40 horsepower motor. The wash pump supplying water to the washing screens and to the deck hose is a 25 horsepower load. Other electric motors power the two shaker screens (7½ horsepower), the gravel conveyor belt (3

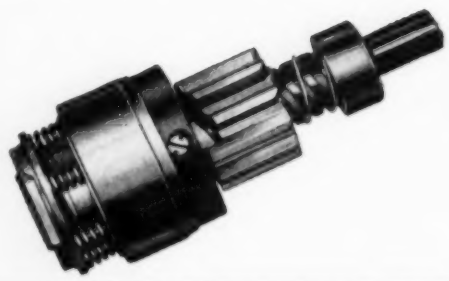
CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts —needs fewer adjustments.

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES

It takes a truly outstanding product to receive over 85,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.



ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION
ELMIRA, NEW YORK
Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

YOU Save up to 50% on diesel cylinder heads

EXCHANGE your cracked or broken

Diesel heads with genuine Guth Company renewed heads . . . guaranteed equal to new. You save up to 50% in cost . . . and get your equipment back into service quickly. Guth prepays outbound freight — return your damaged part after the renewed one reaches you. You'll save time and money with Guth:

IMMEDIATE SHIPMENT FROM GUTH COMPANY STOCKS OF DIESEL HEADS

Caterpillar	Waukesha
International	Cummins
Buda	and many other popular makes

Emergency service day or night . . . just phone 1259 or wire GUTH COMPANY at McPherson, Kansas.

GUTH COMPANY
McPHERSON, KANSAS

New Plant in Operation

Nickolas Fodor

F. J. Hoder, Jr.

Alexander Dreisin

Mr. Don S. Connor, president of Micro-Precision Inc., has announced that manufacturing operations have begun at the new 40,000 sq. ft. plant in Evanston, Illinois. Formerly located at 200 North Laflin Street in Chicago, Micro-Precision Inc. specializes in the engineering, development, and manufacturing of all types of hydraulic controls and fuel injection equipment. During the last five years this company, with its specialized knowledge in the field of high pressure hydraulics has found an ever-increasing outlet for its products and facilities. New products are manufactured either to customer's drawing, or completely engineered and produced to meet the customer's functional requirements.

Mr. Connor, who is also executive vice-president of Micromatic Hone Corporation in Detroit, Michigan, said that management of Micro-Precision Inc. would be under the direction of N. Fodor, executive vice-president and general manager. Sales of all products will be under F. J. Hoder, Jr., sales manager. Mr. Alexander Dreisin will head the engineering department. Before it became a subsidiary of Micromatic Hone Corporation in 1953, Micro-Precision Inc. was known as the Diesel Engineering and Manufacturing Corporation. (DEMCO). Micro-Precision Inc. will continue production of its present line of products in both the diesel and aircraft fields. In addition, greater emphasis is being placed on the engineering and development of new hydraulic products for every type of industry.

Diesel and Automotive Courses

Greer Technical Institute, 2230 South Michigan Avenue, Chicago, has instituted a new two-year, college level course in diesel and automotive engineering. This terminal program is open only to high school graduates and is approved for both civilians and veterans. Classes include 96 semester hours and the terms open in March and September.

THE ENGINEER'S REPORT

DATA

LUBRICANT RPM Delo Oils

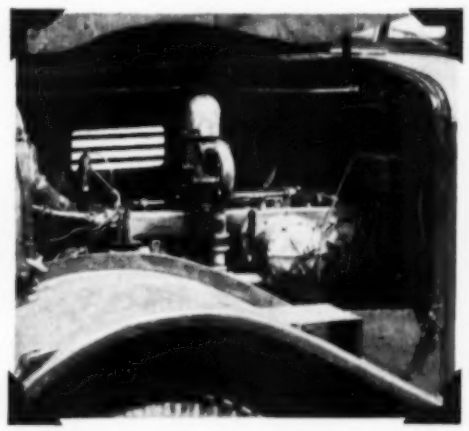
UNIT 325 H.P. L-P engine

SERVICE Highway hauls — heavy loads

MILEAGE 1¼ million

FIRM United Liquid Gas Co., Fresno, Calif.

Only one general overhaul in 1¼ million miles!



USING RPM DELO SPECIAL LUBRICATING OIL, the 325 H.P. engine in this truck is still in good condition after 770,000 road miles and the equivalent of 500,000 extra miles from operating the unit's delivery pump. Overhauled at 520,000 speedometer miles, only pistons, sleeves, bearings and valve guides were replaced. Crankshaft did not need regrinding. United Liquid Gas Co. uses truck to deliver 35,000-pound loads of liquefied petroleum gas. In spite of the great mileage and both on- and off-highway hauls, RPM DELO Special Lubricating Oil kept all engine parts clean. The engine, which burns propane and butane, was free of deposits at every inspection. A spare cylinder head assembly, put in stock when the truck was new, has never been used.

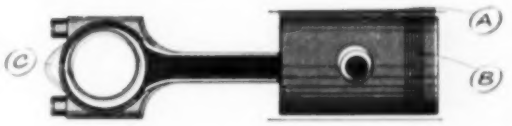
REMARKS: There is an RPM DELO Oil for every type of diesel and heavy-duty gasoline engine. They cut wear and reduce maintenance expense for operators in every industry where such engines are used.

FREE FOLDER on the RPM DELO Oils gives you complete information on how to meet any heavy-duty engine operating condition with one of these oils. Write or ask for it today.

RPM DELO LUBRICATING OILS

TRADEMARK "RPM DELO" REG. U.S. PAT. OFF.

How RPM DELO Oils reduce wear, corrosion, oxidation in all heavy-duty engines



A. Contain special additives that provide metal-adhesion qualities...protect parts whether hot or cold, running or idle.

B. Anti-oxidant resists deterioration of oil and formation of lacquer...prevents ring-sticking. Detergent keeps parts clean...helps prevent piston scuffing.

C. Special compounds stop corrosion of any bearing metal and foaming in crankcase.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • CALIFORNIA COMPANY, Denver 1, Colorado

BIG NEWS
FOR ALL DIESELS!

FRAM completely removes water from diesel fuel with NEW WATER SEPARATOR & FUEL FILTER

✓100% Water Removal! ✓Traps Dirt and Dust!
✓Cuts injector maintenance costs!
✓Reduces down-time!

The new FRAM Water Separator & Fuel Filter is a double-action filter for complete injection system protection—

1. Saves costly injectors from corrosion, rusting and pitting . . . removes all water!
2. Micronic filtration traps dangerous dirt before it reaches injectors . . . ends abrasive action!

Save the cost of replacing expensive injectors! Guard your diesels for longer life . . . less wear . . . fewer repairs—with the new FRAM Water Separator & Fuel Filter! For specific installation information write: FRAM CORPORATION, Providence 16, R. I. Fram Canada Ltd., Stratford, Ont.

IMPORTANT!
Diesels already equipped with FRAM Fuel Filter need only the Water Separator Filter and a new FRAM Coalescer Cartridge for 100% water removal!

FRAM
OIL • AIR • FUEL • WATER
FILTERS

Unique Repair of Crankshafts

THIS article deals with the repair of a cracked crankshaft in marine service. It may serve as well for stationary practice as an illustration that a so-called cold repair of cracks in any crankshaft can be made so that the repair will be sound and reliable for an indefinite period of time.

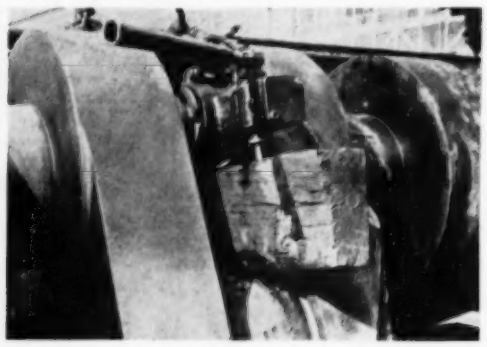


Figure 1

Tests were made on the cold repairs with hydraulic jacks placed between the webs of crankpin No. 8. A bending load of 500 tons was found to be insufficient to disturb them.

About two years ago a crack was found in the fillet of the after end of crankpin No. 8 of a 3300 hp. diesel engine of an ocean-going ship. The shaft had been in use since 1936. The crack was about 7 in. long and 1 in. deep. It was a typical crack caused by crank deflection which usually is the result of main-bearing misalignment. It was decided that it was practicable to effect a satisfactory repair of the crack by the "Metalock" method of cold repair. This patented repair method is accomplished by means of lock bars of special high tensile alloy, that are let into suitably prepared slots across a crack. The repair to the crack in the shaft was completed during the ship's scheduled stay in port and, upon approval by Bureau Veritas, the ship proceeded on its scheduled voyage from Buenos Aires, Argentina, to La Havre, France.

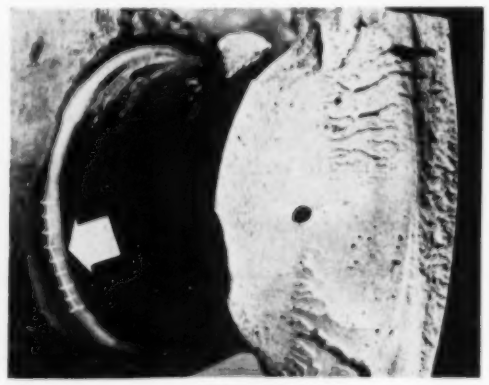


Figure 2

High stress concentration in the area of the cold repair failed to disturb it but the crankweb opposite to the repaired one broke.

The cold repair of cracks in a heavy (18 in. dia.) shaft by the Metalock technique was a rather new venture in Europe at that time. It was therefore of very special interest to European marine circles. Immediately upon arrival a close examination was made by several interested parties. The findings of everyone concerned were so favorable that Bureau Veritas extended—the classification certificate of seaworthiness for another voyage across the Atlantic and return, after which it was intended to replace the old shaft with a new one. From Le Havre the ship arrived at Montreal, Canada, where, during a routine inspection of the engine, a crack was discovered in the fillet of crankpin No. 6. This crack was in exactly the same relative position as the repaired crack at crankpin No. 8. At that time no change could be detected in the original Metalock cold repair to the fillet of crankpin No. 8. A Metalock cold repair was promptly made to this latest discovered crack in crankpin No. 6. The ship then returned to Europe and eventually was dry docked in Rotterdam, Holland, where the new crankshaft was installed.

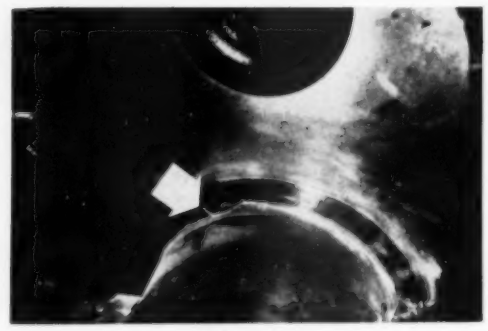


Figure 3

Before repair. A 25 in. long crack developed at the fillet of a main bearing journal. This is a 19½ in. diameter cast steel crankshaft out of a 4000 hp. diesel engine.

For the benefit of the ship owner's engineering department and other interested parties arrangements were made for tests to destruction of the two cold repairs. Hydraulic jacks were placed between the webs of crankpin No. 8, shown in Fig. 1, at a distance of about 24 in. from the crankpin fillet so that a bending load could be applied resulting in high stress concentration in the area of the cold repair. A bending load of 500 tons was found to be insufficient to disturb the cold repair but instead of that the fillet of the other (forward) web of crankpin No. 8 failed as shown in Fig. 2.

Figure 4

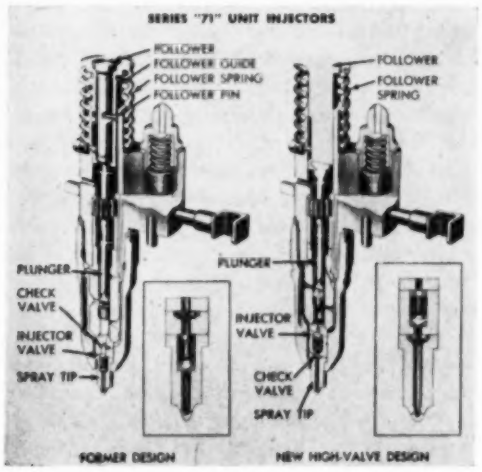
This photo shows the same shaft after Metalock cold repair of the crack.

Accordingly the actual breaking strength of the cold repair was not reached by this test, but the fact that 500 tons bending load could not effect the cold repair is quite significant, particularly so after the exposure of the repair to an estimated 20 million stress cycles, during about 14 thousand miles of ship propulsion. The destructive test of the No. 6 crank required 550 tons bending load. The initial rupture took place, not along the line of the Metalock repair, but along a line in the fillet which intersected the Metalocked repair line. The calculated stress in the area of the cold repair, while a 500 tons bending load was applied with a leverage

of 24 in. amounted to approximately 40,000 psi. This stress is higher than the elastic limit of the usual shaft material.

In Figs. 3 and 4 is shown a Metalock cold repair before and after of a large cast steel crankshaft (19½ in. dia.) of a 4000 hp. diesel engine at a U. S. Government plant in which a 25 in. long crack had developed at the fillet of a main bearing journal. One attempt had been made to repair this crack by fusion welding which failed after only one week of operation. The Metalock cold repair was then made as shown, after which the engine was in practically continuous use for 3½ years, or more than 200 million stress cycles.

Unit Fuel Injector Changes by GM



The Detroit Diesel Engine Division of General Motors has announced several changes contributing to longer life and increased operating efficiency in GM unit fuel injectors used in its line of Series 71 diesel engines. New engines leaving the factory are now equipped with the improved injectors and parts kits are available which make it possible to incorporate the same improvements in injectors now in use. In the newly designed units the injector valve assembly has been moved from its former location within the spray tip to a higher position to lessen its exposure to high cylinder temperature. The head of the new injector valve is now square in shape rather than round and maintains the former valve's crowned surface to insure maximum seat sealing.

Increased protection against compression pressure and heat is provided for the valve spring through a relocation of the check valve. This part is now located below rather than above the spring. A new spray tip was designed to accommodate the check valve. The number of wearing parts in the follower assembly, which transmits motion from the rocker to the injector plunger has been reduced. Also, the follower spring is now heavier and stronger. Smoother and more complete fuel combustion while the engine is operating at part load, is attained by a new plunger and bushing assembly. This is shorter and a new "helix" on the plunger varies timing according to rack position. There is little change in the external appearance of the new injectors but they are easily identified. They are known as "High Valve" injectors and are marked either "HV6," "HV7," or "HV8." These symbols indicate new units of 60, 70 or 80 cubic millimeter capacity, respectively.

Two parts kits have been developed by the Division for servicing injectors now in use. One kit makes possible the use of new component parts in the previous low-valve type injectors without conversion, while the other provides for conversion to full High Valve design. The amount of servicing required on a unit already in service determines the kit to be used.

The former type injectors can be used with new or converted units on an engine in any combination as long as all injectors are of the same cubic millimeter capacity. It is, therefore, unnecessary to convert all of the injectors on an engine when one unit, requiring servicing, is converted.

Heads Washington, D.C. Office

Paul G. Tomalin

Paul G. Tomalin, widely known marine engineer of Alexandria, Virginia, has been appointed by The Maxim Silencer Company, Hartford, Connecticut, to head their new Washington Office. Mr. Tomalin is responsible for sales and engineering of all Maxim products in the District of Columbia, Maryland and Virginia. The new Maxim Office, opened March 15, is located in the Warner Building at 13th and E Streets, Washington, D.C.

Mr. Tomalin started his marine career by serving on the New York State School Ship *Newport*, graduating in 1924. He then spent time at sea before entering Webb Institute of Naval Architecture and Marine Engineering in 1926. Upon graduation, he was employed by the Luders Marine Construction Company. He joined the United States Coast Guard in 1931 as Assistant Naval Architect. In 1936, Mr. Tomalin transferred to marine engineering, and has been Chief of the Machinery Technical Section for the last ten years.

Work on New Plant Begun

Site preparation work for the new Caterpillar Tractor Co. plant at Decatur, Illinois, has begun according to an announcement by vice president T. R. Farley. Contract for site preparation has been awarded to the construction firm of Jansen & Schaefer of Pekin, Illinois. Six other contracts for work at the new plant have been awarded. Structural steel will be furnished and erected by the Mississippi Valley Steel Co., of Decatur. Other contracts have been awarded for the boilers and auxiliary equipment, a 300,000 gallon elevated water tank, air compressors, unit substations and switchgear, general mechanical work and general electrical work.

The manufacturing building is to cover an area 880 by 830 feet with approximately 730,000 square feet of floor area and similar in design and appearance to the building now in use at Joliet, Ill. The office building also is to follow the general pattern of the office building at the Company's Joliet plant.

The SIMPLER THE FILTER THE LOWER THE COST

Specify Bendix-Skinner RIBBON FILTER ELEMENTS . . .

• LOWER ORIGINAL COST

SIMPLE, INEXPENSIVE TO INSTALL

•NO EXPENSIVE BACK UP SUPPORT REQUIRED

• PERMANENT TYPE

•HIGH FLOW RATE (EITHER DIRECTION)

• EASILY CLEANED

It seems hard to believe, but you can actually have more efficient filtration at considerably lower cost if you simply use Bendix-Skinner ribbon elements instead of expensive and less adaptable metal edge or metal screen types.

Here's how it works—Bendix-Skinner ribbon elements are inexpensive to begin with and can be installed at far less cost than metallic elements that require special back-up supports. In fact, in practically every instance present metallic-type elements can be changed over to ribbon-type with substantial savings.

Ribbon units are available in diameters from ½" to 6" in any required length with filtration rated at 40 microns (.0016").

Our engineering department will be glad to advise on new installations or to furnish replacement units in a variety of sizes. Write us for details.

PHENOLIC-RESIN IMPREGNATED CELLULOSE

Performance proven in millions of installations.

Bendix-Skinner

ORIGINATOR OF MICRONIC FILTRATION

BENDIX-SKINNER DIVISION OF Bendix

P.O. BOX 135, ROYAL OAK, MICHIGAN

Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

Watson Park, the first of several small islands on the MacArthur Causeway leading from Miami Beach. Deadman's Curve is the road to the right with the new road by Troup Bros. on the left, the ship channel is in the upper left-hand corner. Photo taken before final completion of new section.

CAT ON DEAD MAN'S CURVE

By ED DENNIS

Charles Sweeting, Shelley Tractor & Equipment Co. mechanic, gets first crack at this special modified D8 Caterpillar tractor using a model D337 diesel instead of the D13000, raising its horsepower to 220.

Auto Traffic Death Trap Near Miami Eliminated With the Help of a Specially Modified Cat 'Dozer

ATHWART the first bend of the MacArthur Causeway lies a small island, officially called Watson Park, but known to most Miamians as the blimp base or "Deadman's Curve," but whatever it is called this odd shaped chunk of pumped up bay bottom was born without benefit of christening or ceremony in 1931 as a by-product of dredging the nearby ship channel and turning basin and posed a serious problem.

Troup Bros. Construction Co., as the successful bidder to eliminate Deadman's Curve, needed some new dieselized construction equipment for this and future highway jobs. With this in mind and ideas for the future, W. J. Troup went to Shelley Tractor & Equipment Co., Caterpillar distributors for South Florida, and said "I need the toughest diesel tractor with the most horsepower in Florida! Can you get me one? If you can't I'll get somebody who can!"

Shelley Engineers put their heads together with the result that Al Ketchel, shop superintendent, was sent to Memphis, Tenn. to look over a D8 Caterpillar that had been modified with a D337 engine at the shops of the Taylor Machinery Co. Three days later with a pocket full of notes he arrived back in Miami and went to work.

They took a standard D8 tractor and modified it with a model D337 diesel rated at 220 hp. at 1800 rpm. with a Twin Disc torque converter, added 5500 pounds of lead in the roller frame, the engine main frame and crankcase guards for weight and balance, plus 3500 pounds in the weight box on the draw bar. They replaced the 24-inch shoes with 26-inch shoes and installed a 112 gallon fuel tank in place of the regular 69 gallon one. As the model in Memphis had a #25 cable unit, Shelley engineers decided to install an hydraulic blade control unit instead. The finished product according to Ketchel is the toughest Cat tractor with the most horsepower in this part of the country and possibly the only one of this type in the country with an hydraulic unit. During the tests it ripped up a 40 ft. wide asphalt road 6 inches deep at the rate of 125 ft. an hour and will push twice as much dirt as a standard D8.

Elliott Company Appointments

G. C. Bayles

F. L. Humphrey, Jr.

Elliott Company has announced the opening of a new sales office in New Orleans at 256 Lee Circle Building, to service southern Mississippi and Louisiana. Its staff includes G. C. Bayles as manager, and C. W. Britt, Jr., both formerly in the company's Atlanta office. Mr. Bayles attended Polytechnic Institute of Brooklyn, and was a marine engineer at the United States Navy Yard in Philadelphia before joining Elliott's research and development department in 1945. In 1949 he was transferred to application engineering, and in 1953 to their Atlanta district office as a field engineer.

Elliott Company also recently named F. L. Humphrey, Jr. assistant district manager in their Atlanta territory. Mr. Humphrey joined the company in 1938 following his graduation from Georgia Institute of Technology as an electrical engineer. After completion of the Elliott training program, he was assigned to their Atlanta office as a field engineer. In 1942 he entered the army and served four years, returning in 1946 to the Atlanta office.

Railroad Diesels Delivered

The Missouri Pacific has taken delivery of 12 new diesel locomotives out of an order of 66 which was placed late last year. Weekly deliveries will complete the entire order by this month.

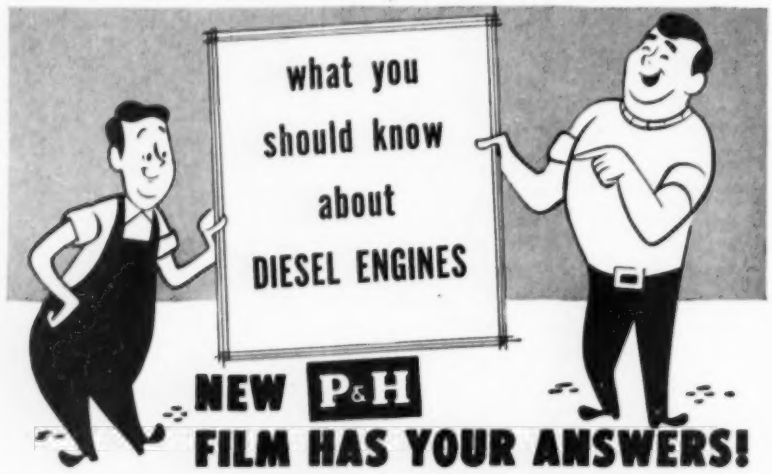
150 Hp. Four-Wheel Tractor

A new 150-horsepower four-wheel tractor has been announced by Caterpillar Tractor Co., in conjunction with the fiftieth anniversary of the crawler tractor, pioneered by Caterpillar. The new tractor, the DW15, is powered by a Cat six cylinder D326 diesel engine, producing 150 hp. at 1800 rpm. with $5\frac{1}{8}$ in. bore and 6 in. stroke. The engine features aluminum alloy pistons with cast in iron band backing for the top compression ring. Chrome-nickel steel heat plugs incorporated into the pistons give longer life. A triple duty oil pump provides positive lubrication on steep grades. Oil can be picked up from the front or rear of the oil pan or from the main oil sump located near the center of the tractor. Standard transmission gives double speed ranges, with 10 forward speeds up to 24 miles per hour and two reverse speeds up to 3.3 mph. Optional final drive gears make possible speeds up to 31.3 mph.

Large capacity wheel brakes are foot pedal controlled and have compressed air boosters. When brakes are applied, those on the pulled unit are actuated automatically just before the prime mover brakes take hold. This insures anti-jacknife protection. The flywheel clutch has an air booster which reduces clutch pedal pressure when engaging and disengaging the dual, 16-inch metallic clutch plates. A comfortable foam rubber seat has an adjustable snubber arrangement which minimizes rebounds and gives greater comfort to the operator. A large 75-gallon fuel tank contains enough fuel for a full day of operation. Wheelbase dimension on the DW15 is $121\frac{1}{2}$ inches. Front tire sizes are 12.00 x 20, 14 ply traction type. Rear tires are 21.00 x 25, 20 ply rock type. Overall length of the new tractor is 16 feet 8 inches.

Improved hitch construction facilitates quick, easy removal of hitch. Front bumper and pull hooks are included as are two headlights on the front and rear bumpers. The tractor features a gasoline starting engine with a 6 volt electric starter. The new tractor, designed for use with the Cat No. 15 Scraper, No. 10 Scraper and W10 Wagon, includes wagon controls and windrow breaker.

Mounted on International Truck
Mounted on Cummins stationary engine
STANDARD OF THE INDUSTRY
Luber-finer
STANDARD AND OPTIONAL EQUIPMENT ON
AMERICA'S LEADING DIESEL TRUCKS
TRACTORS AND STATIONARY ENGINES
SINCE 1936
Luber-finer Models F-120 & F-155 Diesel Fuel Filters
Luber-finer Model 750-2 & 750-3 Industrial
ALLIS-CHALMERS HD20 DIESEL
and Remember!
only GENUINE
LUBER-FINER PACKS
with Exclusive Patented Process
● REDUCE ENGINE WEAR AND MAINTENANCE COSTS
● CLEAN MORE OIL FASTER
● KEEP OIL CLEAN LONGER
FAR BEYOND THAT OF ANY ELEMENT AT ANY PRICE
Luber-finer Packs Available:
REFINING PACK. For use on straight Mineral Oil, Synthetic Oils, Diesel Fuel Oil, Hydraulic Fluids etc.
DIESELPAK. Expressly designed and recommended for use with all detergent type compounded oils.
WRITE TODAY for complete information—see how you, too, can save many dollars and hours in maintenance.
GET THE FACTS FREE!
LUBER-FINER, INC., 2514 S. Grand Ave., Los Angeles 7



NEW P&H FILM HAS YOUR ANSWERS!

For a quick "Diesel education," you should see this new color slide film. You'll be wiser in the ways of modern diesel engines . . . how they operate . . . how they compare with gasoline engines . . . what they'll do . . . why they'll do it better . . . how diesels save you money.
For a personal showing of "What You Should Know About Diesel Engines," see your P&H Dealer. Or, write us for details.

P&H
DIESEL ENGINE DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H line

DIESEL • GASOLINE
ENGINE CRANKSHAFTS
Rebuilt . . .
TO ORIGINAL SPECIFICATIONS!

TRUCKS
BUSSES
BULLDOZERS
EARTH MOVERS
PIT SHOVELS
MARINE DIESELS
STATIONARY ENGINES

CHECK MARKS OF A PERFECT REBUILDING JOB

- ✓ Hard Chrome is deposited on the shaft by the "Rotary Process"—the only way to assure an even deposit.
- ✓ All shafts are given 3 separate electro heat treats at different steps in the rebuilding operation.
- ✓ All shafts are carefully magnafluxed to detect any hidden defects—There's no use in rebuilding a cracked shaft.
- ✓ Experienced Workmen — Specially Designed Machinery — Careful Inspection — guarantee that each Cleveland Hone Rebuilt Crankshaft is rebuilt to *Original Specifications.*

CAPACITY
10" STROKE
24" SWING
96" LENGTH

Write for Information and Prices

ENGINE REBUILDERS
CLEVELAND HONE & MANUFACTURING CO.
8816 HARKNESS ROAD CLEVELAND 6, OHIO
SERVING THE NATION'S LARGEST FLEETS

Inland River Reports

By David I. Day

THE *A. M. Thompson* of the Mississippi Valley Barge Line won her fame on the upper Mississippi and the last winter or two has made towing history on the upper Ohio. Rivermen on the old Monongahela were singing the praises of this noted pusher last week, as far upstream as McKeesport, Pa. No other Enterprise-powered towboat has wider popularity.

WE NOTED the fine towboat *Northern,* 3200 hp., twin Fairbanks-Morse engines headed down the Ohio with 12 barges of steel, 2 of gasoline and a heavy barge of suphate, working slowly against heavy winds. Later Phil Atkinson phoned that he saw the same boat was headed for the mouth of the Ohio to assist the *New Orleans* (once the *Herbert Hoover*) up the Ohio with a heavy cargo. Might add the *New Orleans* is doing fine work since her twin installation of General Motors engines a few years ago.

IT WAS a pleasure to see and photograph the *Henry C. Ogram* near Catlettsburg, Ky., on the Ohio a few days ago. Capt. Bob Bosworth was in charge. For a long time she was an Ashland Oil boat but is now owned by the Point Towing Company. She has Superior engines, around 650 hp.

THE LARGEST tow of the season on the Mississippi above St. Louis, 13,000 tons of oil in seven barges was pushed up past Keokuk, Iowa, recently by the *Cape Zephyr* of the Streett Towing Co., St. Louis. The *Cape Zephyr* is gaining new plaudits every year using triplet Cooper-Bessemers, totaling 2430 hp.

HOWARD Baumgartner wrote from New Orleans that he has just visited boats and boat yards around Houma, Montegut, Chauvin, Morgan City, and Berwick finding diesel the only power used in the fishing and oil industries. He mentioned particularly the good work done by the tugs *Defense* and *LaSalle* of the Pellegrin Towing Co., Chauvin, both using Murphy diesel engines.

WE APPRECIATED also a letter from Clayton Rice, mailed in New Orleans concerning the nice work of the towboat *Totty McCool* on the Intracoastal Canal for her owners, Baker & Company, Houston, Texas. This boat, built in Greenville, Miss., in 1947 is powered with twin Superiors with 1000 hp.

TWENTY YEARS old the Dravo-built *Peace* of the Union Barge Line, Pittsburgh, is out at work on the Ohio after a brief tie-up in late winter. Since 1948 she has had General Motors twins totaling about 1740 hp. with the extra push from Kort nozzles. When seen she was downbound with 16 barges of steel and some empties.

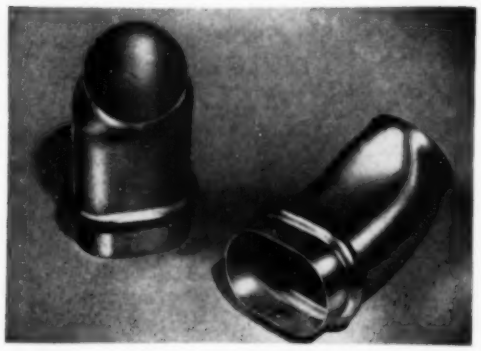
THE Illinois River favorite *Ferdinand* of the Bull Towing Co., Joliet, Ill., has been working lately far up the Ohio in the sulphate trade. This boat has 400-hp. Caterpillar power.

Points on Pyrometry

For temperature measurement beyond 1000° Fahrenheit, a thermo-electric pyrometer is the most economical device giving precision results . . . so says the new Illinois Testing Laboratory bulletin entitled "Temperature Indications." Here is a concise discussion of pertinent facts about pyrometry in general. For instance, did you know that a pyrometer is essentially a small dc. motor, with restraining springs instead of a commutator? It registers the incredibly small amount of thermoelectricity generated when the thermocouple is exposed to heat, translating current flow into temperature readings.

The bulletin goes on to discuss the many primary advantages of a pyrometer over other less sensitive temperature indicators. In brief, pyrometers are more versatile and practical than you may realize. To get the story on modern pyrometry and the line of Alnor pyrometers especially designed for different temperature-reading problems, read "Temperature Indications." Write to Illinois Testing Laboratories, Inc., 420 North LaSalle Street, Chicago 10, Illinois.

Thin-Wall High-Strength Stainless Steel Tubing



This part, a transition elbow, dramatically illustrates what Flexonics Corporation is now doing with stainless tubing only .020 in. thick. Note transition from round to oval, bend and clamping bead, all within four inch length. Although similar shapes have been formed with heavier wall stainless, using die casting, brazing or welding, Flexonics claims to be the first to accomplish such results with thin wall stainless steel tubing.

A new high strength, thin wall stainless steel tubing has been developed by Flexonics Corporation for industrial uses where corrosion resistance, light weight and special shapes and bends may be required. In addition, the 50-year-old industrial metal fabricator states it will engineer special applications of the tubing in combination with fittings and its own flexible tubing or expansion joints. Using the tubing, the company has achieved results that could not be equalled with piping and parts usually found in warehouse stocks. This special engineering service will be performed at Flexonics' Elgin, Ill., plant, under direction of D. Wendell Fentress, vice-president in charge of research and development. Sales manager will be William C. Gage at the Maywood, Ill., headquarters office.

"We believe there is a vast field for this kind of service," Mr. Fentress declared. "In many industries, the growing complexity and size of machinery make economy of weight and bulk important factors, where they were formerly scarcely considered. Moreover, higher temperatures and pressures inherent in many new devices outmode formerly suitable materials. Stainless steel, which we have found can be successfully worked into a great variety of shapes, is helping to free designers from limitations of heavy, expensive castings or multiple-piece assemblies that are welded or brazed together. Among results are precision dimensions, uniformity on production runs and savings in labor and materials because of less complicated parts."

Flexon standard straight wall tube is available in fifteen outside diameters ranging from 1 in. to 6 in. The high strength comes in thirteen outside diameters, ranging from 1.50 in. to 6 in. All but the smaller sizes are available in four wall thicknesses designed to withstand various pressures. The 1.50 in. size in high strength and the 1 in. and 1.25 in. sizes in the standard are made in three different wall thicknesses. On special order, the company will supply diameters, wall thicknesses and tolerances other than thoses hown in specifications. Ordinarily, tolerances are plus or minus .002 or .003 in.

Fittings and component parts can be attached to the straight or flexible tubing by resistance circumferential seam welding. This has been particularly valuable in aircraft applications, where expansion joints and sections of flexible hose must absorb movement and compensate for accumulated tolerances under severe pressure and temperature conditions. For further information and price quotations write Flexonics Corporation, 1325 S. Third Avenue, Maywood, Illinois.

Economy + Dependability =
PALMER ALTERNATORS & POWER UNITS

Engineered for Precise Regulation

STANDBY POWER
PORTABLE POWER
PRIME POWER

PALMER, the originators of Self-Regulated Alternators, was the *first* to bring industry the *economy* of Portable Power...*through self-regulation.*

Over a quarter century's "know-how," in the manufacturing of *dependable* Alternators, enables PALMER to produce the finest voltage-regulated Power Units for every application. All units conform to NEMA, ASA and AIEE standards.

Offering a complete line of Voltage-Regulated and Self-Regulated Alternators from 5 KW to 150 KW, PALMER's experience assures you of highest efficiency, minimum maintenance and low original cost.

PALMER Power Units are available in all standard voltages up to and including 2400 volts and can be furnished complete with any of the leading Diesel or Gasoline engines. See your *local* Industrial Engine Dealer for complete information. Dealers and distributors in principal cities of United States and Canada.

PALMER also manufactures: Synchronous Motors, 400 Cycle Generators and 3600 RPM Lightweight Generators.

A FEW SELECT TERRITORIES OPEN • DISTRIBUTOR INQUIRIES INVITED

PALMER POWER

PALMER ELECTRIC MANUFACTURING CO.
SUBSIDIARY OF LEACH CORPORATION
6629 BEAR AVENUE • BELL, CALIFORNIA

WRITE FOR *New* CATALOG
Complete with engineering data, accessories and information on the use of alternators.

Palmer Electric Manufacturing
P.O. Box 590, Bell, California
Name_____
Company_____
Address_____
City_____ Zone____ State_____

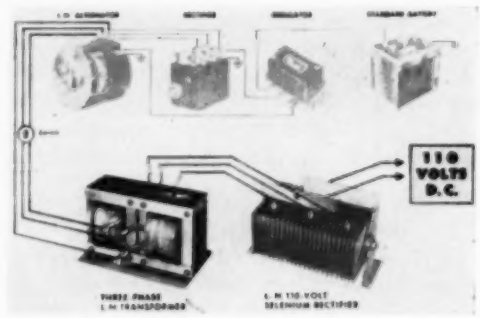
Nordberg Sales Engineer

Richard H. McCarthy

Appointment of Richard H. "Dick" McCarthy as sales engineer, is announced by R. W. Bayerlein, vice president, Heavy Machinery Division, Nordberg Manufacturing Company, Milwaukee 1, Wisconsin. Mr. McCarthy will headquarter at Nordberg's branch office, 419 Cotton Exchange Building, Dallas 1, Texas, serving large, heavy duty engine users in North and Central Texas, Oklahoma, and New Mexico. Empire State born, Richard Harry McCarthy was educated in the public schools of Newburgh, New York. Enlisting in the U. S. Navy in January, 1945, he received his initial diesel engine training at the Navy's Basic Engineering and Diesel Schools, Gulfport, Mississippi. After a year's assignment in the Philippine Islands, McCarthy returned to civilian status in the United States and earned his degree in Mechanical Engineering at Oklahoma A & M, majoring in Power Engineering.

In 1951 McCarthy joined the Nordberg Manufacturing Company at Milwaukee where he progressed through Production, Engineering and Service Departments, qualifying for assignment to the Sales Department in June, 1953. His appointment as Sales Engineer for the Dallas Area is representative of Nordberg's policy to promote qualified young men in an expanding program to provide greater service to Nordberg engine customers and prospective users.

New Transformer



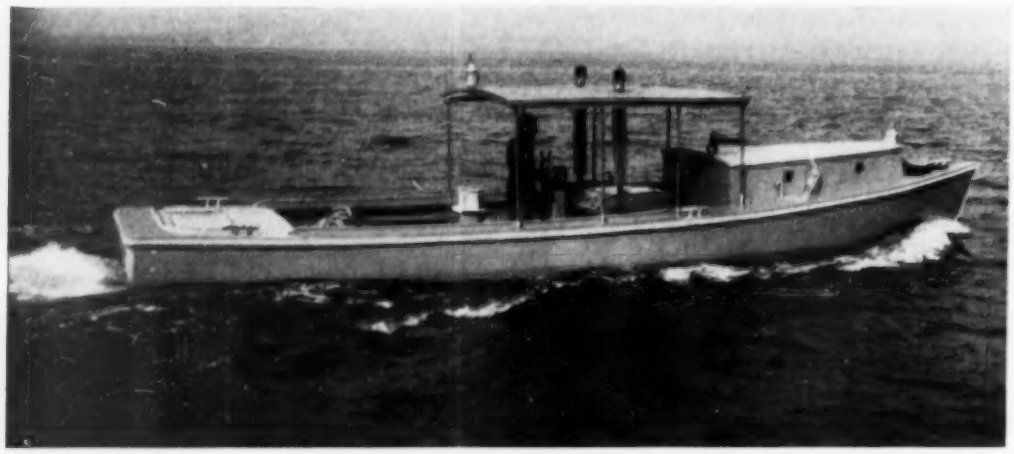
A three-phase transformer, newly developed by The Leece-Neville Company, Cleveland, now makes it possible to obtain up to 1200 watts of auxiliary 110 volt dc. power to operate tools and appliances in automotive vehicles equipped with the Leece-Neville Alternator system in place of conventional dc. generators. The new transformer takes full advantage of the high power output of the alternator for such purposes as operating ⅜ in. electric drills, small chain saws, pneumatic tools, electric blankets, artificial respirators, traffic signals, flood lights, etc., direct from a utility truck, construction machine or fire or police emergency vehicle.

Unlike the presently available 250 watt 110 v. ac. transformer (which delivers a frequency equal to 1/10th alternator rpm.), the new unit's output is independent of motor speed. The new transformer (along with a companion 110 v. selenium rectifier) is operated in parallel with the standard rectifier and voltage regulator, leaving undisturbed operation of the alternator for its primary purpose, that of supplying 6 v. dc. power for high-efficiency battery charging and vehicle operation. Two models of the new transformer are available: for 6 volt systems, the 1013-T unit is rated at 800 watts; for 12 volt systems, the 1012-T unit has an output of 1200 watts.

Changes in Field Personnel

Several changes in the field sales and service organization of the Detroit Diesel Engine Division of General Motors have been announced by E. F. Bentley, general sales manager of the Division. Bart W. Patrick, formerly sales representative in the Division's northwest zone which includes the states of Oregon and Washington has been moved to the New England zone in the same capacity. Leslie Southgate, who was formerly sales representative in New England will assume a new assignment in the industrial sales department in Detroit. J. T. Hanna, former service representative in Oregon and Washington becomes sales representative in the same zone and Harold J. Vaughn is moved from the service training department in Detroit to the post vacated by Mr. Hanna.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. $10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



Starboard side of new M&T Shallow Draft Tug running free, showing handy arrangement for one-man operation.

New Murray & Tregurtha Shallow Draft Welded Steel Tug requires only 12" draft!

The New M&T Welded Steel Tug, Model No. 225-1, is designed especially for operation in very shallow rivers and canals. Twin screws, *operating in special side entrance tunnels*, permit unhampered service where efficient operation of tugs with a conventional bottom entrance tunnel would be impossible.

Two diesel engines with a total of 76 h.p. drive the screws. The side entrance tunnels assure a maximum flow of water and utmost thrust efficiency. A substantial bottom plate closes the bottom of the tunnels, protecting the twin propellers and rudders from damage caused by grounding or striking submerged obstacles. Arrangement of steering and engine controls and bitts permits easy one-man operation.

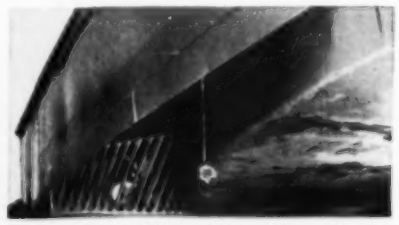
Tests show a speed of approximately 4.9 SMPH (7.9 km/hr.) towing a barge of 25 tons displacement. The tug is complete and fully tested before shipment and is quickly readied for operation upon arrival at destination. The tremendous potential of this new tug should be fully investigated by those having shallow water towing problems.

A complete line of New Design Tugs in various sizes with draft from 12" to 24". Write or phone us about your problem, or ask for Detailed Specifications on New Shallow Draft Tugs.

MURRAY & TREGURTHA, Inc.

6 Hancock St., Quincy 71, Mass.

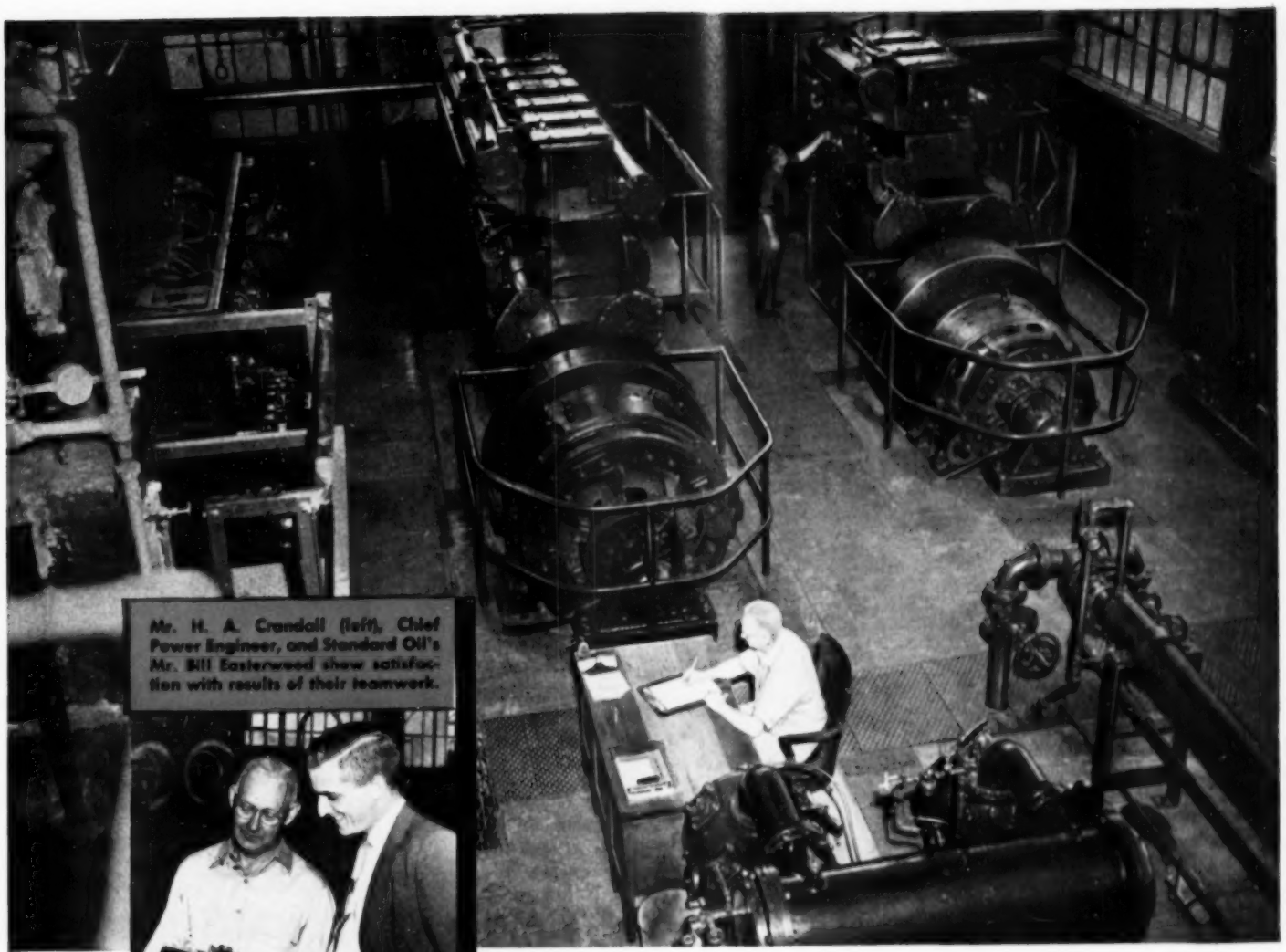
Stern view, running free, showing arrangement of the two diesel engines, controls, bitts, etc.



Starboard side, looking aft from below the hull, showing tunnel entrance, debris screen, and propeller.

Towing Murray & Tregurtha Test barge. Barge has a displacement of 80 tons, and for additional drag the propellers of the three Harbormaster Units on the barge were fully submerged.

Stern view, looking into the tunnels, showing rudders, propellers and debris screens. Note the plate across bottom of tunnels to protect the rudders and propellers from damage if grounded.



Mr. H. A. Crandall (left), Chief Power Engineer, and Standard Oil's Mr. Bill Easterwood show satisfaction with results of their teamwork.

Here's a 27,000-hour record for low wear and clean operation!

● This diesel power plant serves a large midwest manufacturer of steel products.

The plant superintendent was increasingly aware that lubrication of his two diesels was not all that it should be. There was trouble with stuck rings, and crankcases showed excessive deposits. Working with a Standard Oil lubrication specialist, the superintendent switched his engines to STANDARD HD Oil.

During some 27,000 hours' operation of each unit, engines have remained exceptionally clean. Ring sticking troubles have been eliminated. Cylinders have shown less than 0.01" wear — a reduction of 50% over the previous, similar period. Neither of the original fills of STANDARD HD have needed to be replaced.

Midwest diesel operators are getting record efficiency and economy with the help of STANDARD HD. Your Standard Oil lubrication specialist can help you get similar results. Phone your local Standard Oil office. Or, write: Standard Oil Company, 910 South Michigan Ave., Chicago 80, Ill.

STANDARD HD
TRADE MARK
OIL

STANDARD OIL COMPANY

STANDARD (Indiana)

FULL FLOW • FULL FLOW • FULL FLOW • FULL FLOW • FULL FLOW • FULL FLOW

EVERYBODY IS TALKING ABOUT

FULL FLOW

BUT... Briggs PIONEERS IN MODERN OIL FILTRATION

HAS HAD IT FOR 15 YEARS!

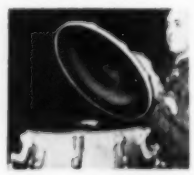
Here's the full-flow filter that's packed with LABOR and TIME SAVING FEATURES!

- UP TO 25 GPM PER CARTRIDGE WITH EXTREMELY LOW PRESSURE DROP
- HIGHEST WORKING PRESSURES

NO TOOLS NEEDED

"EXCLUSIVE BRIGGS EASI-LIFT COVER"

. . . and there's a Briggs patented DISC-PAC throw-away cartridge to go with this "all-convenience" filter case. The combination will give you more oil and engine protection than competitive material.



IF IT'S THE PEAK IN DIRT TRAPPING and holding that you want . . . if you want to filter out those micronic sized abrasives . . . and give complete protection to your engine . . . then by all means get the latest information on what genuine Full Flow results can mean to you.

WRITE OR MAIL THE COUPON FOR DETAILS

THE BRIGGS FILTRATION CO., Dept. 26
RIVER ROAD, WASHINGTON 16, D. C.

Please send me data sheet on Briggs filter cartridges and your D and H series filter cases.
No obligation, of course!

Name _____ Title _____

Company _____

Address _____

Officers Elected

J. A. Cuneo

At the annual meeting of the shareholders of Fairbanks, Morse & Co. held recently, O. S. Leslie, vice president in charge of Manufacturing of the company, was elected to the Board of Directors. At the subsequent meeting of the Board of Directors, J. A. Cuneo who has for the past several years been general sales manager of the company, was elected vice president in charge of Sales, and Robert B. Craig, formerly assistant to the president, was elected a vice president with his headquarters in Washington, D.C.

Mr. Cuneo joined the Fairbanks-Morse organization in 1929 as a field engineer representing the company's Export Division, during which time he traveled in the West Indies and in Latin America. He was later manager of the company's Havana, Cuba, branch, and in subsequent years he was assistant manager of the Export Division in New York. Still later he was a member of the organizing staff of Fairbanks-Morse de Mexico in Mexico City. In 1951 he became general sales manager, following a successful regime as manager of the company's Los Angeles branch where he was located from 1947 to 1949.

Colonel Robert H. Morse, chairman, reported to the shareholders that while the company's business for 1953 was somewhat less than that enjoyed in 1952, nevertheless the outlook is extremely good. The complete list of officers for the company for 1954 were elected as follows: Col. Robert H. Morse, chairman and general manager; Robert H. Morse, Jr., president; Robert B. Craig, vice president; J. A. Cuneo, vice-president-Sales; O. S. Leslie, vice president-Manufacturing; G. J. Malone, vice president and comptroller; V. H. Peterson, vice president-Railroad Sales; L. W. Stolte, vice president-treasurer; A. L. Stoddard, secretary; L. R. Gaiennie, director of personnel; E. T. Sandeen, assistant secretary.

Fittings Catalog and Piping Handbook

A new 304 page fittings catalog and piping handbook has been announced by Ladish Co., Cudahy, Wis., giving detailed dimensional data and specifications on complete line of controlled quality seamless welding pipe fittings, forged ASA flanges, large diameter and TEMA flanges as well as screwed and socket welding fittings. Catalog includes a 56 page technical data section featuring new, easy to use, allowable stress and P/S tables, maximum allowable working pressure charts as well as many other tables up to date in latest provisions of applicable piping codes and standards to assist in solving pipe problems. Copies may be obtained by writing to Ladish Co., Cudahy, Wis.

SAVE REPLACEMENT AND DISMANTLING COSTS
with
METALOCK
THE WORLD-WIDE MACHINERY REPAIR SERVICE

Our organization has proved in the field a practical cold repair for cracked and broken castings and forgings of ferrous and non-ferrous metals. We reinforce machinery parts weakened by erosion, corrosion, galvanic action or excessive heat. Service is performed by especially trained and licensed engineers for manufacturers, industrialists, ship operators and underwriters. With a minimum of dismantling you can have guaranteed repairs made right on location. Reduce down time and production losses; cut replacement cost by calling on Metalock!

The Metalock Systems are being used throughout the world for the repair of diesel engine frames, bases, liners, jackets, pistons, cylinder heads, crankshafts, air compressors, pump casings and flywheels. They are used for repair of cracked or eroded turbine casings, steam valves and for unlimited applications throughout the entire industrial and marine fields.

In case of breakdown don't worry—phone Metalock! OUR METAL SURGERY WILL SOLVE YOUR PROBLEM AND SAVE YOU MONEY.

WRITE FOR BULLETIN DESCRIBING OUR SERVICE

METALOCK
REPAIR SERVICE, INC.

HOME OFFICE: 36-15 48th Avenue, Long Island City, N. Y.

Agencies in: Chicago, Tulsa, Houston, Philadelphia and other principal cities. Consult telephone directory.

METALOCK INTERNATIONAL ASSOCIATION, LTD.: Grand Buildings, Trafalgar Square, London, W. C. 2, and 35 other countries.

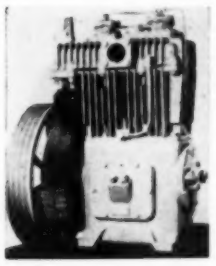
Fast Removal of Entrained Water

An unusually successful water separator is produced by the Warner Lewis Company, Division of Fram Corporation, Tulsa, Oklahoma. Named the Excel-So, it is designed to remove entrained water from light hydrocarbon products and its performance records are impressive. Originally, it was built to remove water and dirt from aviation gasoline.

Now, it is employed on a large scale by both the petroleum and aviation industries to handle avgas, jet and diesel fuels, LPG and petrochemicals. Its compactness and proved efficiency have also brought it into increasingly wide use in the process industries. Especially interesting is the job done by the separator in taking water and solids out of pipelines that carry fluid products, thus substantially reducing rust, sludge and scale, which aggravates corrosion problems and may lead to a considerable number of operating difficulties.

The Warner Lewis separator employs a treated wood fibre packing. The packing is preferentially wet and water particles are coalesced into large droplets that settle rapidly. This permits high water removal, high product flow rate and short residence time of the product in the separator drum. In order to obtain optimum flow conditions and minimize pressure losses, much of the Warner Lewis separator piping is fabricated with Tube-Turn welded fittings. They also eliminate leakage and excessive maintenance overhead. Usually the fittings are of carbon steel. But Monel is extensively used for the various components of separators installed aboard the Navy's aircraft carriers, since sea water is very corrosive. Warner Lewis separators for carriers will process aviation gas at a 1200 gpm. clip. Tube-Turn welded fittings are manufactured by Tube Turns, Louisville, Kentucky, a division of the National Cylinder Gas Company, Chicago.

New Compressor for Diesel Starting

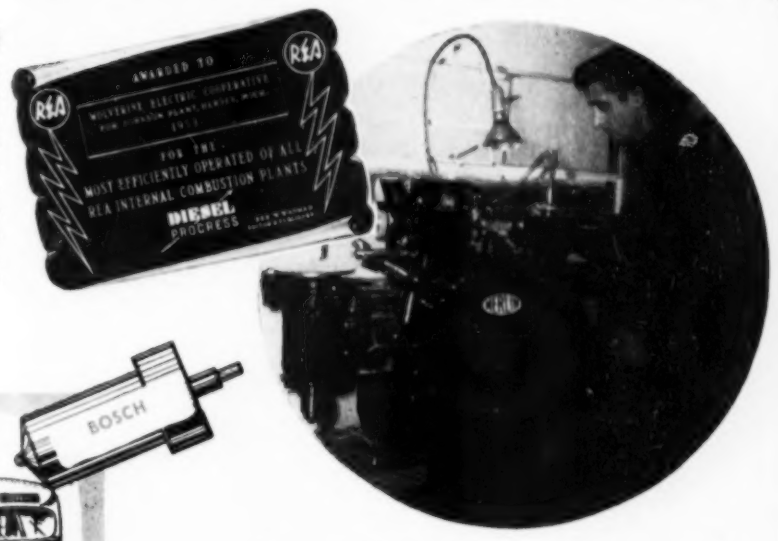


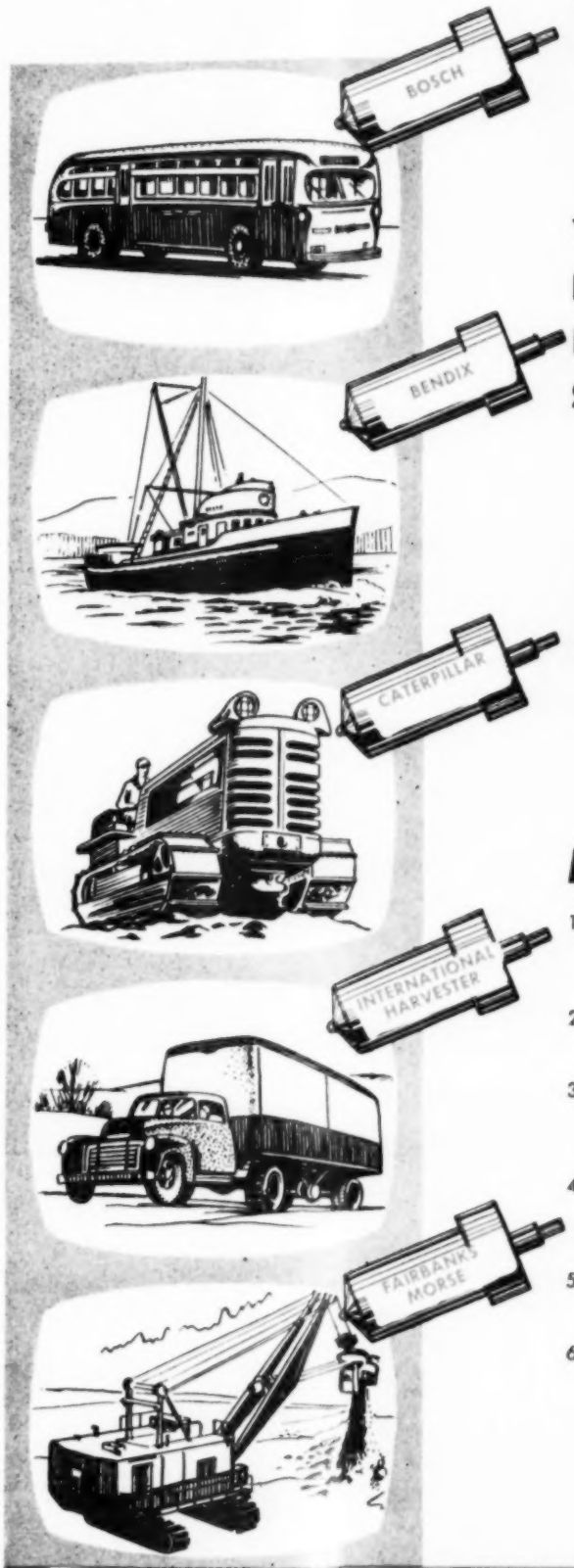
Designed for diesel starting and auxiliary compressed air supply, the new Quincy model 350 is a two stage compressor with a 6 in. and 3¼ in. bores x 3½ in. stroke. Maximum piston displacement is 51 cu. ft. Maximum continuous pressure is 200 psi. and 350 psi. intermittent. New Quincy model 350 compressors are equipped with safe-Q-lube which when the unit is equipped with Quincy patented loadless starting automatically unloads the compressor when the lubricating oil level is low. Safe-Q-lube also operates Quincy's patented loadless starting with 62% less parts for lower maintenance. Loadless starting can easily be added to model 350 compressors in the field. Other new features include a positive displacement lubricating pump and pressure spray to main bearings.

Quincy Model 350 compressors are available with electric motor or gasoline engine drive or both. In addition to the basic unit, tank or base mounted models are available. For further details, write Quincy Compressor Co., Quincy, Illinois.

WE ARE PROUD

to announce that Wolverine Electric Cooperative have been MERLIN users over the two years during which they have so justly won the REA award. You too can obtain the maximum efficiency from your injectors by following the same procedure and relying on the judgment of the Wolverine Electric Cooperative and all other diesel experts throughout the U.S.A. and the rest of the world.





You Can Have Perfectly Reconditioned Atomizer Nozzles With A MERLIN Service Master In Your Own Shop

MERLIN
SERVICEMASTER

WORLD PATENTS PENDING

Look At These Facts:

1. It is the only machine that will grind all diesel atomizer nozzle needle seatings to manufacturer's original standards.
2. 90 laps or needles per hour can be ground to correct angles.
3. On the same machine — at the same time, a second operator can be lapping in seatings with laps or needles.
4. Without any loss of accuracy, the Merlin Service Master is adjustable for all grinding operations within its capacity.
5. It will grind valve seats, hardened tappets, taper or parallel rollers and pins.
6. It will quickly lap flats to wringing fits.

Install a Merlin Service Master at once.
It will keep your diesel engines at work.
It will cut your fuel consumption.
It will lengthen the life of your engines.

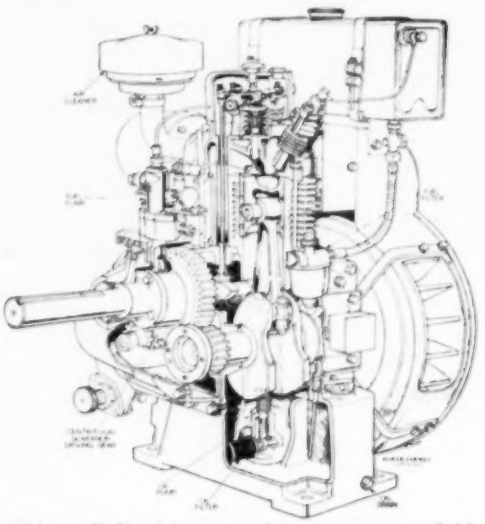
BURNETT MACHINERY (CANADA)
168 KING ST., E., TORONTO, ONT., CANADA
MAIN DISTRIBUTOR & SERVICE AGENTS FOR THE U.S.A. & CANADA

Lightweight Aircooled Diesel Engine

The Petter Diesel Engine Division of Brush Aboc, Inc., New York, announce the availability of a new small aircooled diesel known as their model PAZ1. It is believed that this new unit is the world's smallest four cycle full diesel engine in production today and should prove to be a valuable addition to the existing well-known Petter diesel line. The Petter PAZ1 is a single cylinder, four stroke cycle, air cooled diesel developing 2½ hp. at 1500 rpm. continuous rating. The engine has a bore and stroke of 3 in. with a bmep. of 62 lbs./sq. in. and a maximum mean piston speed of 750 ft./min. produces a conservatively rated power unit. The engine is of robust construction, has a dry weight of 260 lbs. and with air cooling is suitable for a wide range of power applications. The crankcase of cast-iron is tunnel bored, the lower part of which forms the lubrication oil sump.

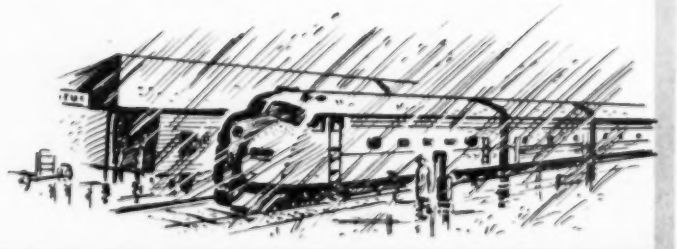
The crankshaft is carried by two steel backed thin shell precision type flanged bearings which are white metal lined. One of these bearings is pressed into the crankcase at the gear end of the engine, and the other is carried in a cast-iron bearing housing bolted to the crankcase at the flywheel end of the engine. Crankshaft thrust is taken in either direction between the flange faces of the main bearings and the relative faces of the crankshaft. The connecting rod is an 'H' section steel stamping with steel backed thin shell precision type big end bearings. The top half of the bearing is lined with copper lead and the lower half with white metal. The small end bush is lead bronze lined with steel back.

The combustion chamber is formed by an offset hemispherical bowl in the crown of the aluminum-alloy piston. The piston is carried on a fully floating wrist pin and has three compression rings and two slotted scraper rings. The top compression ring is chrome-plated to reduce cylinder bore wear, thus providing a longer cylinder life between overhauls. Fuel is gravity fed from a one-gallon capacity tank to the Bryce fuel pump which is mounted on the timing gear cover. The fuel pump is operated directly from the engine camshaft via a plunger which is fitted with a roller in contact with the fuel cam. Adjustments to the spill timing are made by means of shims under the fuel pump. Incorporated in the fuel system is a Tecalemit fabric filter. The governor is of the centrifugal type and is housed in the gear timing cover. It is totally enclosed but the engine speed can be quite easily varied over a small speed range.



This small diesel is expected to open up new fields in the industrial, marine and agriculture markets, where economical, safe and dependable small power units are in great demand.

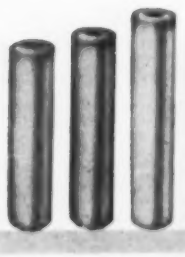
Water is good for some plants... but... NOT for DIESEL POWER PLANTS



REDUCE INJECTOR REPAIRS!

IMPROVE ENGINE PERFORMANCE

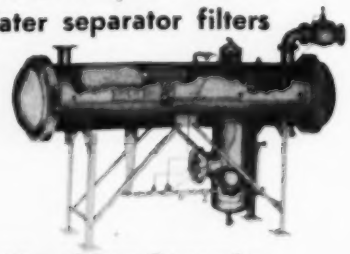
The best replacement filter cartridges for all your Diesel needs



WARNER LEWIS COMPANY
BOX 3096 • TULSA OKLAHOMA

ONLY EXCEL-SO GIVES YOU COMPLETE PROTECTION AGAINST BOTH DIRT AND WATER

With a complete line of Water separator filters

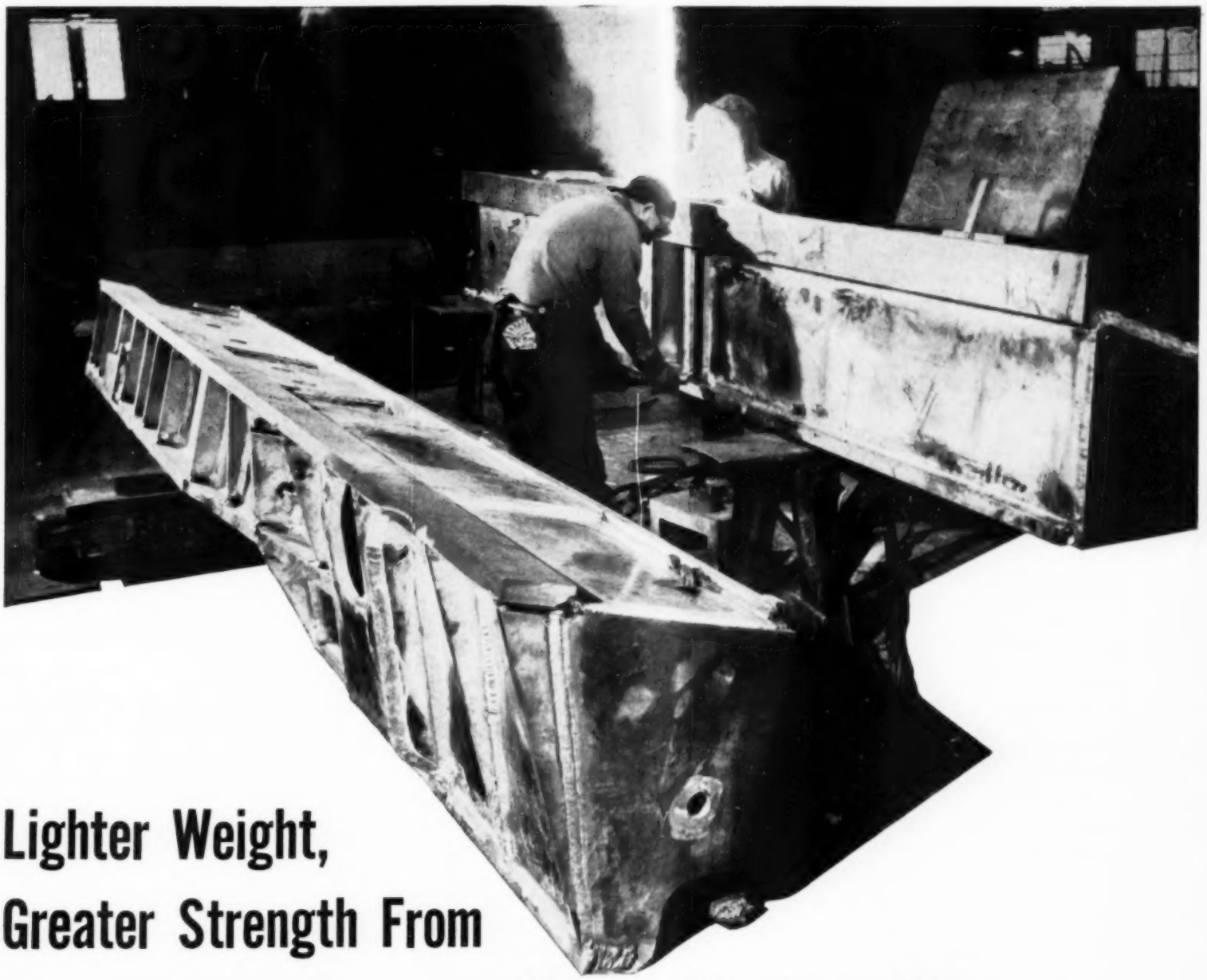


Division of Fram Corporation

FOR FURTHER INFORMATION, SEND COUPON

to Warner Lewis Company
Box 3096, Tulsa, Oklahoma

Name _____
Company _____
Street Number _____
City _____ State _____
☐ send catalogs ☐ have representative call



Lighter Weight, Greater Strength From Diesel Engine Bases of Welded Aluminum Plate

BENEFITS PROVED IN ALUMINUM PISTONS, HEADS AND CRANKCASE-CYLINDER BLOCKS ARE APPLIED TO DIESEL ENGINE BASES

Engine bases seventeen feet long are being welded from aluminum plate—swinging open the door to ideas previously considered impractical. With this type of fabrication, designers, builders and users of diesel power can make use of aluminum's lighter weight, greater strength and shock resistance. The technique is an Alcoa development; the fabrication is being done by REPUBLIC STRUCTURAL IRON WORKS in Cleveland, Ohio.

Aluminum weldments are one more product of close co-operation between engine designers and our own development and research specialists. The facilities they used in producing new alloys and new processes are yours for the asking. So, ask your Alcoa sales engineer about them today. Call your nearby Alcoa sales office—listed under "Aluminum" in the classified section of your telephone directory, or write: ALUMINUM COMPANY OF AMERICA, 1987-E Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

ALCOA ON TV brings the world to your armchair with "SEE IT NOW" featuring Edward R. Murrow, Tuesday evenings on most CBS-TV stations.

DIESEL ENGINE CATALOG

Are you a contractor buying new power for your equipment? Are you an engineer designing a new plant? Do you need a certain engine to meet certain requirements? Do you sell engines and want to know what your competition is doing? Do you use or service diesel, dual-fuel or gas engines? THEN YOU NEED VOLUME 18 of DIESEL ENGINE CATALOG!

VOLUME EIGHTEEN

- Brush-ABOE
- American Locomotive
- Atlas Diesel Engine
- Baldwin-Lima-Hamilton
- Buda
- Burmeister & Wain
- Caterpillar
- Chicago Pneumatic
- Cleveland Diesel
- Continental
- Cooper-Bessemer
- Cummins
- Deere
- Detroit Diesel
- Deutz
- Electro-Motive
- Enterprise
- Fairbanks-Morse
- Graymarine
- Hallett
- Harnischfeger
- Hercules
- Hill
- Ingersoll-Rand
- International Fermont
- International Harvester
- Kahlenberg
- Lister-Blackstone
- Mack
- Massey Harris
- Murphy
- Nordberg
- Oliver
- Packard
- Sheppard
- Sterling
- Stewart & Stevenson
- Superior
- Union
- Venn-Severin
- Waukesha
- White-Roth
- Witte
- Worthington

This new edition of DIESEL ENGINE CATALOG gives you five big sections, five books in one:

- An engine section fully illustrated with complete technical descriptions and specifications.
- An accessory section describing engine and plant accessories.
- A transmission section describing torque converters, etc.
- A classified buyers' guide giving valuable information as to the source of many items you buy in the diesel industry.
- The advertising section which further details the manufacturer's product.

COMPLETELY RE-EDITED

Improvements and changes are normal to a healthy, growing industry. Unless your information source brings you up-to-date on all these changes and improvements, you are not receiving the maximum benefits due you. Volume 18 of DIESEL ENGINE CATALOG performs this service. It is new. It is complete. It is as modern as the latest engine improvement. Every major engine manufacturer is represented between its two covers. It answers your need for complete, concise and easy to read information.

ORDER YOUR COPY NOW!

Fill out and mail the coupon below and DIESEL ENGINE CATALOG, Volume 18 will come to you postage pre-paid. Any other old reference book is obsolete. The cost is but $10.00.

DIESEL PROGRESS 816 No. La Cienega Blvd., Los Angeles 46, California

Enter my order for a copy of the DIESEL ENGINE CATALOG, Volume 18, edited by Rex W. Wadman, for which I enclose $10.00 (plus sales tax if for delivery in California). Copies may be ordered in the Sterling Areas by remitting £4:0:0 to DIESEL PROGRESS, St. Paul's Corner, Ludgate Hill, London, E.C.4.

NAME.....

TITLE..... COMPANY.....

ADDRESS.....

CITY..... ZONE..... STATE.....

Mid-Continent Diesel News

By Jack F. Cozier

NORTHWESTERN Engineering Co., Denver, Colorado, has bought a Murphy diesel Model 24-A (altitude engine), rated at 185 continuous bhp. at 1200 rpm. to be used to power a Cedar Rapids rock crushing plant. The Murphy diesel was sold by Power Equipment Co. in Colorado, dealer for Murphy Diesel Co., and is expected to be operated at 6000 ft. altitude.

CLARK Bros. Co., Tulsa, Oklahoma, will be moving on to their new site provided by Dresser Industries late this summer. The new site is at 15th & Sheridan where Clark will have their regional sales and service engineering offices, warehouses and a complete parts depot. Other Dresser Industries affiliates will join Clark Bros. on this 15 acre tract.

LEON C. Smitherman Drilling Co., Augusta, Kanhas, has purchased a Unit Rig U-34 drawworks from the Manufacturers Distributing Co. at Great Bend, Kansas. The drawworks is powered with a Murphy diesel model 421 and equipped with a Twin Disc 11,500 series converter. Attached to the unit is a Gardner-Denver FXZ mud pump powered by a Murphy diesel model 122, 190 bhp. at 1200 rpm.

W. A. ALEXANDER, president of the Denver Tramway Corp., has revealed that his company has bought 50 new 51-passenger diesel buses. The buses were ordered bought by the Colorado PUC and will be built by GMC Truck & Coach Division with delivery set for June 1st.

CYCLONE Drilling Co., Tulsa, Oklahoma, purchased a model 12103 General Motors diesel unit from the Diesel Power Co., Tulsa, Oklahoma. The engine will be installed on an Independent pump drive.

SCATT Drilling Co., Drumright, Oklahoma, has bought a model 12103 General Motors diesel engine to increase the power of a small rig. The sale was made by the Diesel Power Co., Tulsa, Oklahoma.

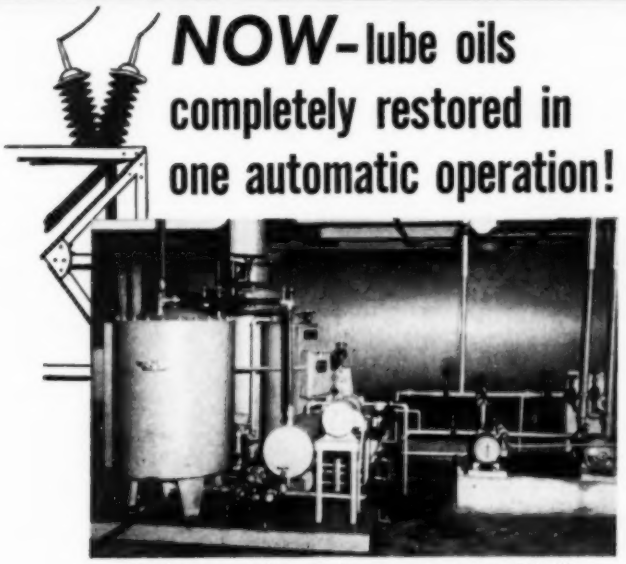
JOHN F. Beasley Construction Co., Dallas, Texas, has taken advantage of an adept unitization of welding units on the El Paso Natural Gas Co.'s new 18-story office building in downtown El Paso, Texas. Beasley uses a NHRIS-600 skid-mounted Cummins diesel and 150 kw. generator to supply power for 15 heavy-duty arc welders. The unit is hoisted from floor to floor as the building is erected.

CITY of Tulsa, Oklahoma, has purchased a General Motors 100-kw. diesel generating unit from the Diesel Power Co., Tulsa, Oklahoma. The engine will be used as an emergency stand-by unit at the Mohawk Lake Water Station near Tulsa.

H. C. BUNDY, Tulsa, Oklahoma, has bought a series 2-51 General Motors diesel engine to be used for driving an irrigation pump, sale made by Diesel Power Co., Tulsa, Oklahoma.

Protect Your Engines this "Wolverine" Way

NOW–lube oils completely restored in one automatic operation!



One 300 g.p.h. Hoffman Oil Conditioner serves three 3500 HP diesels at the Wolverine Electric Cooperative's Johnson Plant, Hersey, Michigan.

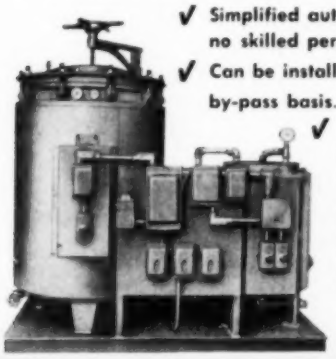
The Hoffman Oil Conditioner is more efficient and economical than other methods because it restores lube oils to "like new" condition in a single, simplified, automatic operation — eliminating costly, time-consuming additional processing.

More than a filter which only removes solid contaminants, the Hoffman Oil Conditioner does a complete job by also removing moisture and fuel dilution. This is accomplished by a vaporizer which uses heat and vacuum to drive them off — delivering lube oils, completely free of all contaminants, maintained at a stable viscosity.

Write today for Hoffman Oil Conditioner Bulletin A-974 giving full details.

Check these Hoffman Oil Conditioner features!

- ✓ Cleans, dehydrates, and degasifies lube oils in one, automatic operation.
- ✓ Low in cost—pays for itself in a short time through oil savings alone.
- ✓ Low operating and maintenance costs.
- ✓ Simplified automatic controls—requires no skilled personnel to operate it.
- ✓ Can be installed on a continuous or by-pass basis.
- ✓ Each Hoffman Oil Conditioner is tailored to fit your operation. Standard models from 25 to 600 g.p.h. with larger models available as special units.



Hoffman

INDUSTRIAL FILTRATION EQUIPMENT & SERVICE

U. S. HOFFMAN MACHINERY CORP., 237 LAWSON STREET, SYRACUSE 6, N. Y.

In Canada: Canadian Hoffman Machinery Co., Ltd., Newmarket, Ont.

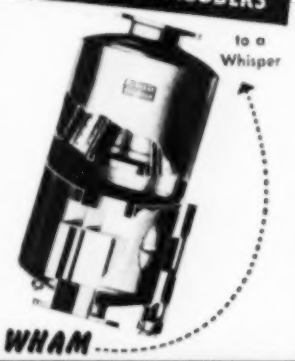
QUIET THOSE DIESELS

STOP SPARK DANGER

with BURGESS-MANNING Spark Arrester EXHAUST SNUBBERS

Noiseless, smoother, safer operation are prime specifications of every Burgess-Manning Marine Snubber. Every one is engineered to the specific problem of maximum engine performance by completely dissipating the energy of exhaust gas slugs — therefore, quiet efficiency.

Every one is built to render lasting satisfaction under severest conditions. There are no obligations for recommendations—send us a description of your problem.



to a Whisper

From a WHAM

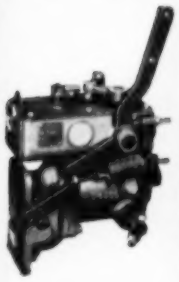
BURGESS-MANNING COMPANY

747 East Park Avenue, Libertyville, Illinois

high in performance

low in cost

parts & service in the field



PIERCE GOVERNORS

for all Gas and Diesel Engines

Pierce centrifugal governors are your most dependable and efficient control mechanisms for industrial engines . . . from small generator sets to monster power units . . . gas (LPG), gasoline or diesel. For engines requiring extra power to position fuel rack or valve, the Pierce centrifugal with hydraulic booster (for original equipment only) is ideal! Replacement governors and parts are available through your local distributor or fuel injection service station.

For distributor's name or information on special governing problems, write

The PIERCE GOVERNOR Co.

INCORPORATED

1612 Ohio Avenue • Anderson, Indiana

PIERCE

"SPECIFY PIERCE CENTRIFUGAL GOVERNORS ON YOUR ENGINES"

Florida Diesel News

By Ed Dennis

THE *Pelican Driller* which slid down the ways of the Dade Drydock Corp. recently is the first of possibly 25 to be constructed for use on oil drilling locations in the Gulf of Mexico. The 121 footer is expected to do 14 knots with her two 348 hp. Buda diesel engines.

THE Key Largo Ocean Reef Club received a T.D. 18 International Harvester tractor from Florida Georgia Tractor Co., Miami, who also delivered a T.D. 14 International dozer to the Dade County Mosquito Control.

A WOLVERINE model 6 NKD 250 hp. at 1000 rpm. was installed in the new 70 ft. trawler *Bubbie & Zadie* at Tampa Marine Co. plus a 3 kw. Fairbanks Morse diesel generating set. Two 35 hp. Lister diesels power the dual refrigerator systems.

THE City of Coral Gables received a D6 Caterpillar tractor from Shelley Tractor and Equipment Co., who also shipped a D6 dozer to Jim Woods of Miami for construction work.

MAYPORT is the home port for the new Lathrop powered 71 ft. *Miss Lisbon* owned by Rolland Fish Co. The engine room contains a model D.H. 200 Lathrop diesel with Capital 4:1 reduction gears and a Petter diesel for auxiliary use.

CUMMINS Diesel Engines of Florida powered Powell Crosby's new yacht built by Huckins at Jacksonville with two 300 hp. Cummins diesels of the NHRS series and Huckins "V" drive.

AT DeFONCE Construction Co.'s pumping project in Miami were two model 4 dc. Buda diesel 14-inch pumping units with Twin Disc clutches and 3 General Motors 3-71 units with 12-inch Fairbanks Morse pumps.

AT JACKSONVILLE, the Marine Motor Sales powered the *Jim Barrett*, a 55x18 fishing trawler out of Mayport, with a 100 hp. Lathrop model D 100. She was named for Pvt. A. James Barrett, USMC.

Eaton Valves and Bolts for Diesel Engines

Reflect the Experience of Thirty-Five Years as a Supplier to Leading Diesel Engine Builders

- **Years of forging experience, plus the most modern forging equipment**
- **Heat treatments under strict metallurgical control**
- **Highly specialized precision production facilities**
- **Rigid adherence to customer specifications**

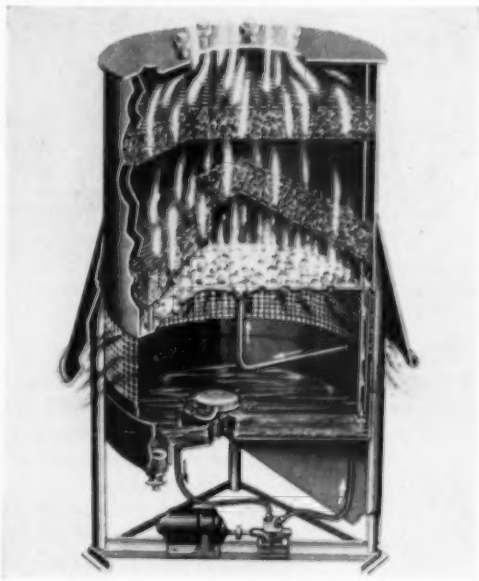
EATON MANUFACTURING COMPANY

General Offices: CLEVELAND, OHIO

VALVE DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springlites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

Oil Bath Air Cleaner



New low resistance type Cycoil oil bath air cleaner for engines using turbochargers or pressure blowers for scavenging is announced by American Air Filter Co., Inc., Louisville, Ky. This Cycoil designated as Type P introduces a new principle in oil bath air cleaning—the perforated entrainment plate—by which with Vari-flow valves, it is claimed that a uniformly high cleaning efficiency can be obtained in an operating range from as low as 10% up to full rated capacity, and at an overall resistance in the order of 2 in. wg. The air upon entering this new design Cycoil first passes through metered orifices in a horizontal plate that is flooded with oil where it entrains enough oil to wet the dust before passing into a cone-shaped filter. The slope of this conical filter accelerates the migration of the collected oil to the outer edges that extend into an annular chamber which is out of the air stream. The migrating oil carries the collected dust with it and provides the necessary washing action to keep the filter clean. From the annular chambers the dirty oil flows back through drain tubes to the reservoir below where the dirt settles out as sludge. A small motor driven pump moves the oil up to a distributor head in the center of the perforated plate.

This new AAF Cycoil cleaner is made in eight sizes and a capacity range of from 1100 cfm. to 21,000 cfm. Bulletin No. 160-A issued free upon request to American Air Filter Company Inc., Louisville 8, Kentucky.

"33,000 HOURS proved the choice was right!"

When a prominent North Carolina community converted its power plant to diesel operation, it called in Sinclair Lubrication Engineer Jim Holt for his recommendations on proper lubricants.

Mr. Holt reports, "I recommended Sinclair RUBILENE®. My previous experience convinced me that this diesel lubricating oil would provide maximum wear protection for this power plant's six 1000 K.W. diesel engines. RUBILENE also guards against sticking rings and prevents excessive wear of cylinders, pistons and other moving parts operating continuously for long periods.

"RUBILENE was the right choice," Mr. Holt continues. "After 33,000 hours of near-continuous operation, bearings show very little discernible wear – and there's not a sign of erosive or corrosive action. *Oil consumption is remarkably low*, considering the prolonged operating hours under overload. All six 1000 K.W. engines, with a total output of 6400 K.W. per hour, *use a total of only 1 barrel of oil a day!*"

Why not give a Sinclair Lubrication Engineer the chance to help solve *your* lubrication problem. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL L BRICANTS

FAMOUS LAST WORDS:

"it can't happen here"

Let's face it — it can. Being ready for emergencies has become a part of our daily life, whether we like it or not. The emergency may be an atom bomb—or it may be a fire, a flood, a tornado. It's good business to be ready for it —whatever it is. Take these precautions TODAY.

☐ Enlist the help of your local Civil Defense Director.

☐ Check contents and locations of first-aid kits.

☐ Send staff to Red Cross courses. They may save your life.

☐ Promote preparedness in your community. Your local CD Director can show you how.

Set the standard of preparedness in your plant city—check off these four simple points NOW.

SPACE FOR THIS **CIVIL DEFENSE** MESSAGE CONTRIBUTED BY

R. G. Wadman

Changes in Industrial Sales Organization

H. K. Woodward

John D. MacGuffin

The Briggs Filtration Company has announced the following changes in its industrial sales organization. Mr. H. K. Woodward, formerly regional manager of the North Eastern and North Central regions, has been promoted to the position of general industrial sales manager. Mr. Woodward, regional manager for the past six years, has been a member of the Briggs organization since 1945 in various sales, sales development and research capacities. His new duties include directing all functions of the company's industrial sales program. Mr. John D. MacGuffin has been named regional manager of the North Central Region with headquarters in Chicago and Mr. C. J. DeVries, regional manager of the South Eastern Region. Mr. R. A. Howland will continue to be regional manager of the South Central Region.

Diesel Driven Arc Welders Available

The International Fermont Machinery Company has recently added diesel drivers dc. arc welders to their line of gas and diesel generators. Two sizes, one a model 300 DV4 and the other model 400 DV4, are powered by International Harvester diesel engines. The arc welders themselves are built by General Electric Company. The two units are available on a four-wheel trailer when specified. The entire unit is ordinarily closed in a sheet metal weather resisting housing and is assembled on a rigid structural steel base.

Designed for compactness but keeping in mind easy access to the controls, the generator and the diesel engine, Fermont welders have excellent welding characteristics permitting good techniques. Inherent rapid voltage recovery makes arc striking easy and prevents popouts. A dual control permits the selection of any type of arc or arc intensity to suit both classes and thickness of material. Among others, the units are designed and are effectively used on the following types of jobs: Factory construction and repairs, general construction jobs, oil field equipment construction and repair, marine equipment repair and construction, pipe line construction, heavy railroad equipment maintenance, structural steel fabrication and maintenance and general heavy factory construction and maintenance work.

The diesel engine used is, on model 300 DV4, International Harvester model UD-264, four cylinder, four cycle, 4 in. bore by 5¼ in. stroke, 264 cubic inch displacement, brake horsepower 51 at 1500 rpm. Engine used on model DV4 is International Harvester model UD-94, four cylinder, four cycle, 4.4 in. bore by 5.5 in. stroke, 334.5 cubic inch displacement, brake horsepower 69 at 1500 rpm. The welding range of the International Fermont arc welders is from 60 amperes at 20 volts to 375 amperes at 40 volts to 500 amperes at 40 volts on the model 400 DV4.

For complete specifications write to File 113, DIESEL PROGRESS, Box 8458, Gale Station, Los Angeles 46, California.

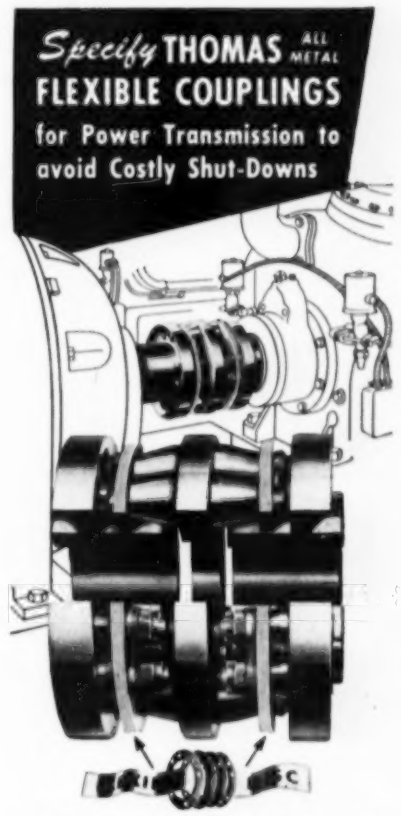
Expands Line of Heat-Resistant Paints

Expansion of the line of Heat-Rem high resistant paints to include two new colors is announced by Speco, Inc., Cleveland. Now available in metallic red and metallic blue, in addition to the standard H-170 aluminum and XG-170 gold, Heat-Rem is said to withstand temperatures up to 1700° F. without flaking, blistering or burning. The manufacturer states that Heat-Rem, which is made of aluminum flakes in a silicone base, can be applied by either brush or spray gun, and with "dry air" in approximately 30 minutes. Upon heating, it will fuse with the surface of the metal on which it is applied, forming a protective metal coating. This coating is reputed to prevent rust, resist corrosion from mild acids, alkalies and industrial fumes, and expand and contract with temperature changes. The paints are recommended for ovens, barbecues, stoves, heaters, driers, furnaces, exhaust manifolds, mufflers, motor blocks, heat fines, compressors, engine heads, radiators, boilers, condensers, all metals subjected to high heat. For information on Heat-Rem, write to Speco, Inc., 7308 Associate Avenue, Cleveland 9, Ohio.

Indicator Valve Features New Design

Bacharach Industrial Instrument Co. is introducing an engine valve of entirely new design. Instead of the conventional practice of using the tip of the valve spindle as the seating element, a free-floating nickel-alloy ball is used. The ball is forced into a conical seat by the engine pressure when the valve is closed. In this closed position the valve spindle is backed away from the ball and therefore shielded from the direct flame of combustion. This prevents galling of the threads and sticking of the spindle in the gland. The valve is opened by one turn of the handwheel which causes the spindle to move inward and force the ball off its seat.

This new design makes possible opening and closing the valve by hand pressure with assurance of positive, tight closure under all operating conditions. Such permanent pressure tightness is said to be of particular importance for application on gas engines and compressors where accidental opening of an indicator valve may result in hazardous conditions due to the escape of combustible gases into the engine room. Another practical advantage claimed for this valve is that it does not have to be removed from the engine for replacing any of its parts. Further information is available from Bacharach Industrial Instrument Company, 7301 Penn Avenue, Pittsburgh 8, Pa.


Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.
DISTINCTIVE ADVANTAGES
FACTS
EXPLANATION
NO MAINTENANCE
Requires No Attention. Visual Inspection While Operating
NO LUBRICATION
No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH
No Loose Parts. All Parts Solidly Bolted
CAN NOT "CREATE" THRUST
Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement
PERMANENT TORSIONAL CHARACTERISTICS
Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.
Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.
Write for our new Engineering Catalog No. 51A
THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

Over 85% of the torque wrenches used in industry are

STURTEVANT

TORQUE WRENCHES

Read by Sight, Sound or Feel.

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams...inch ounces,..inch pounds ...foot pounds

Every manufacturer, design and production man should have this valuable data. Sent upon request.

The Sturtevant Co.

PETROMETER

Remote Reading

LIQUID DEPTH GAUGES

FOR ALL FUEL OIL STORAGE TANKS

Write for Bulletin PD

LIQUIDEPTH INDICATORS, INC., 43-22 Tenth St., Long Island City 1, N. Y.

DIESEL ELECTRIC GENERATOR SETS

20 KW TO 1200 KW

Fairbanks-Morse 1136 KW. on our test stand.

WRITE FOR FREE DIESEL BROCHURE

DIESEL DIVISION
NATIONAL METAL & STEEL CORP.
Dept. P, 1251 New Dock St., Terminal Island Sta., Los Angeles, Calif. Phone NEvada 6-2517

BEST for DIESELS!

How are your Revs?

STICHT UNIVERSAL HAND TACHOMETERS

CENTRIFUGAL TYPE

5 RANGES IN ONE INSTRUMENT

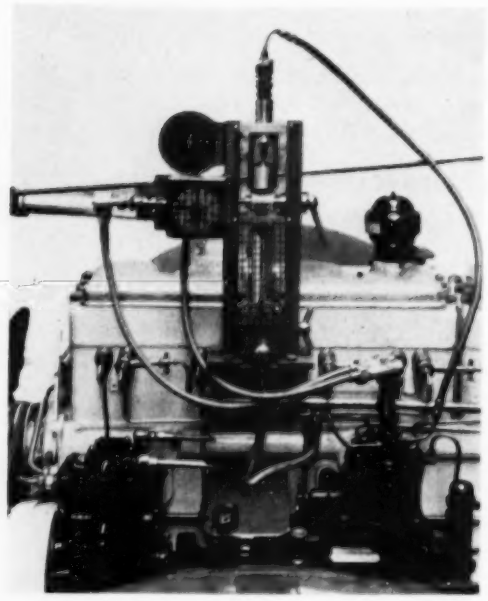
CATLG. 303 : 30-12,000 RPM

FOR DETAILS WRITE FOR BULLETIN NO. 750.

HERMAN H. STICHT CO., INC.

27 PARK PLACE NEW YORK 7, N. Y.

Portable Fuel Delivery Test Stand



The Cummins Engine Company distributor of Clichy, France, S.O.V.I., has developed a compact, extremely portable fuel delivery controller for Cummins engines. It can be used on H (S), HR (S) and NH (S) types of pumps without having to remove the pump from the engine.

In operation, the Cummins fuel pump delivers fuel through the elbow corresponding to No. 6 cylinder of the distributor disc and a flexible hose, to the inlet connection shown in the top part of the photograph above. Two flexible lines, starting from the distributor head, are connected, one, to the revolution counter, the other to a tachometer controlling the speed of the engine. The two flexible hoses shown at the bottom of the photograph are fuel drain hoses returning to the fuel tank. A copper tube connects No. 1-, 2-, 3-, 4-, 5-cylinders. It eliminates part of the fuel delivery of the pump, allows full throttle, and avoids change of delivery caused by the regulator during the test.

The five cocks between cylinders must be closed when starting the engine and opened for the test. Calibrated holes and check valves are provided on a connection located between the nut, tube and inlet connections of 1 to 5 cylinders. A calibrated hole is provided on inlet connection No. 6. Fuel delivery is collected in a graduated glass, engine set at regulated pump speed, and deviated to fuel tank by means of a shut-off valve after 500 engine revolutions.

According to word received from S.O.V.I., numerous tests have been made in the field. Whenever the field-tested truck came into their shop, the pump was tested on their shop stand. Fuel delivery showed the same for both tests. Weight of the unit, including the wooden box for transport is about 35 pounds.

F-M Appointments

Mario A. Gasque

A. M. McLaren

Paul A. Suess

Mr. Robert H. Morse, Jr., president of Fairbanks, Morse & Co., has recently announced the appointment of Mr. Mario A. Gasque as general manager of Fairbanks, Morse de Mexico S.A., and Manufacturera Fairbanks, Morse S.A. with offices in Mexico City and Tlalnepantla. Mr. Gasque started with the company in Mexico in 1946 as chief accountant, and was promoted successively to the positions of secretary-treasurer and credit manager, then assistant manager. He succeeds Mr. Paul A. Suess who has been transferred to the company's Los Angeles branch as manager. Mr. Alfred M. McLaren, who has been manager of the Los Angeles branch, has been transferred to St. Louis to take over the company's branch house operations in that area, succeeding Mr. Cliff Schroeer who passed away recently.

CRANKSHAFT REPAIRS

SPECIALIZING IN LARGE CRANKSHAFTS

CALL OR WIRE

MAIN 2-5242

BRODIE SYSTEM

AN ENGINEERING SERVICE

Shafts brought to standard sizes— no need for undersize bearings

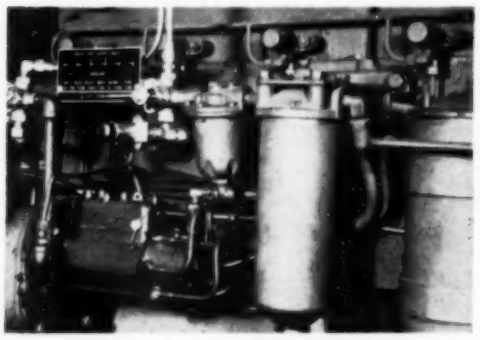
- REGRINDING
- STRAIGHTENING
- THERMIT WELDING
- METALLIZING

115 CLIFTON PLACE, BROOKLYN 38, NEW YORK

LARGEST CRANKSHAFT GRINDER IN A JOBBING SHOP

Generator Set for Corps of Engineers

The U. S. Corps of Engineers has in use and in production at International Fermont Machinery Company generator sets that are performing efficiently. Units assembled by International Fermont Machinery were specially designed with 60 kw. Delco generators, Buda No. 844 diesel engines and the Roosa-Master fuel injection pump manufactured by the Hartford Machine Screw Company.



Roosa-Master Fuel Injection Pump on 60 kw. generator set built for U. S. Corps of Engineers by International Fermont Machinery Company. A feature of the pump is the variable speed droop adjustment which can be made without stopping operation.

The pump is a single cylinder, opposed plunger, inlet metering, distributor type. Built in features of this compact unit are the supply pump, mechanical flyweight governor and an electrical solenoid shut-off. The pump lubricates itself. The solenoid shut-off is connected to the throttle valve which, upon becoming de-energized, shuts off the supply of fuel immediately. This shut-off device permits the stopping and starting of the unit without altering the throttle control and without the threat of air locking. Another unique feature of this installation of the Roosa-Master fuel injection pump is the variable speed droop adjustment which can be made while the unit is in operation.

To adjust from 60 cycle operation to 50 cycle operation and maintain the same speed droop at 50 cycles, it is only necessary to replace the speed by conventional means and make the adjustment by turning the throttle control rod projecting from the governor control cover approximately 8 turns counter-clockwise. The mechanics of the adjustment are extremely simple. After speed has been reduced, remove the socket cap screw affixing the rod locator on the end plate of the pump; turn the rod approximately 8 turns counter-clockwise; replace the socket cap screw as before.

Oil and Gas Power Conference

With a technical program planned to interest and benefit pipeliners, power plant operators, and all concerned with diesel fuel and gas engines, the 26th Annual Conference and Exhibit of the Oil and Gas Power Division of ASME is scheduled in the Muehlebach Hotel, Kansas City, June 14-17. Highlighting the program will be technical papers on cooling system problems, cooling equipment, foundations for pipeline compressors, engine analyzers, turbocharging 2-cycle engines, gas transmission compressor design trends and pipeline constructions. There is also scheduled a technical session co-sponsored by the Gas Turbine Power Division on gas turbines in pipeline pumping.

The program of technical meetings interspersed with exhibit inspection periods starts 9:30 a.m., Monday, June 14 and winds up with an interesting inspection trip Thursday p.m., June 17. Mention the ASME meeting when requesting reservations at the Muehlebach.

Executive Vice-President

B. F. Pfeifer

The board of directors of Electric Service Engineering Co., Joliet, Illinois, designer and manufacturers of electrical control panels, distribution equipment and switchgear, have elected B. F. Pfeifer executive vice president of the company. Mr. Pfeifer joined Esco in 1950 and has served the organization as Sales, Purchasing and Engineering Department manager and as assistant secretary and manager, Governmental Division.

Write for FREE WATER TREATMENT BOOKLET

- *Technical Data*
- *Installation Plans*
- *Case Histories*

No matter what kind of water-treating process you are now using, you'll be interested in this free booklet which explains in detail how the SOLA Catalytic Water-Treating Process will cut your operating and maintenance costs. Packed with technical data, installation plans and case histories, this booklet shows how SOLA retards the formation of scale and gradually reduces old scale and corrosion in Diesel plants without any change to the chemical structure of the water. Write for this informative booklet today.

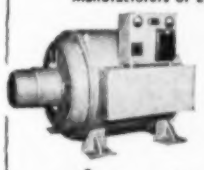
MAIL THIS COUPON TODAY

The Latest in Water Treatment for Hot and Cold Water Systems, Stationary Engines, Busses, Automobiles and Trucks.

SOLA CATALYTIC CO.
520 Browder St.
Dept. 13 Dallas, Texas

Name .....
Firm .....
Address .....
City ..... State .....

A.C. Anywhere
with KATO GENERATORS
350 WATTS TO 300 K. W.
Manufacturers of Electrical Machinery Since 1928



Larger sizes available in speeds of 720, 900, 1200, 1800 RPM at 60 cycles. Can be furnished as illustrated, complete in every way.

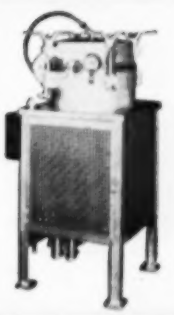
WRITE FOR FULL DETAILS AND FREE LITERATURE

Many sizes available with direct or belted exciter. Odd frequencies from 25 to 400 cycles are our specialty. Can be arranged for standard S.A.E. engine bell housing adaption.

KATO Engineering Company
1443 FIRST AVENUE MANKATO, MINNESOTA

HILCO LUBE AND FUEL OIL PURIFICATION FOR DIESEL AND GAS ENGINES . . .

PURIFIERS · FILTERS · RECLAIMERS · CONDITIONERS
THERE'S A HILCO FOR EVERY LUBRICATION AND FUEL OIL FILTERING PROBLEM . . .
YOU WANT CLEAN OIL AND CLEAN ENGINES TO SAVE EQUIPMENT - OIL AND MONEY -
INVESTIGATE HILCO OIL MAINTENANCE METHODS
★ *WRITE FOR FREE LITERATURE - NO OBLIGATION*



• THE HILLIARD CORPORATION, 122 W. FOURTH ST., ELMIRA, N. Y. •
IN CANADA — UPTON-BRADEEN-JAMES, LTD. — 890 YONGE STREET, TORONTO, 3464 PARK AVE., MONTREAL

Massey GOVERNORS

Type OS OVERSPEED SHUTDOWN GOVERNOR

•

for any size engine or turbine

•

Hydraulic and Centrifugal Governors for every application of engine control.

Write for Catalog OS-254

MASSEY MACHINE CO.

783 PEARL ST. WATERTOWN, N.Y.

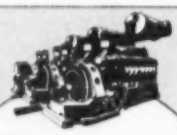
DIESEL ELECTRIC POWER
for
IMMEDIATE SHIPMENT

Unit Capacities
10 to 1875 Kva
A.C. 50-60 Cycles
Various Voltages

Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S.F), California, and Jersey City, N. J., and see units in operation on our test stand.

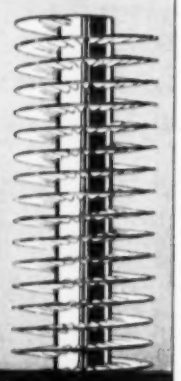
"SPECIALISTS IN DIESEL POWER"

A. G. Schoonmaker Co., Inc.
50 Church St., New York 7, N. Y.



Throughout the Power Industry-

Aerofin Fin-Type Heat-Transfer Units do the job Better, Faster, Cheaper.....



AEROFIN CORPORATION
410 South Geddes St. Syracuse 1, N. Y.

Diesel De-Odorizer

The Dieseler, a new remedy for diesel engine exhaust fumes, is shown in the photograph together with one of the catalytic units (Oxycats) that are the heart of the exhaust system. This twin-flow, heavy-gage steel catalytic muffler containing eight catalytic units is one of the several models now being made by Oxy-Catalyst, Inc., for a wide range of 4-cycle diesel equipment.

The flanged end (bottom) of the Dieseler is connected to the exhaust manifold of any 4-cycle diesel engine. The unburned carbon monoxide and hydrocarbon fumes of the engine exhaust flow across the catalyst-coated rods of the Oxycats where they are converted by catalytic oxidation to carbon dioxide and water vapor.

Foreseen are broad applications for the Dieseler on 4-cycle diesel trucks and busses, construction and materials handling equipment and stationary diesels. In such applications, the manufacturer states that the unit can greatly reduce and in most cases completely eliminate the annoyance factor of the exhaust of any 4-cycle diesel engine that operates fairly steadily at 60 percent of rated load or more. For the full announcement on the Dieseler, see page 5 of this issue.

What you pay for power is not as important as what it costs!

YOU GET FAR MORE SERVICE PER HORSEPOWER DOLLAR FROM STEWART & STEVENSON

When you are ready to buy engines, there is one important question we would like to suggest that you keep foremost in your mind. Not "what's the price?"—but WHAT'S THE COST IN THE LONG RUN? When you buy from Stewart & Stevenson, you get these definite advantages: the engines and products handled by Stewart & Stevenson Services are recognized leaders in their field. Stewart & Stevenson assumes full responsibility for your job . . . and we guarantee every installation to perform as specified. Stewart & Stevenson maintains the largest stocks of replacement parts within two hours of your job. Add to these advantages the largest staff of trained industrial engine mechanics in the Nation . . . plus a backlog of experience gained through thousands of engine applications under every operating condition and you will find the reasons why Stewart & Stevenson is the Nation's largest distributor of General Motors Diesel Engines . . . the best source to solve any of your power requirements. You get far more service per horsepower dollar from Stewart & Stevenson.

GM DIESEL POWER

CATERPILLAR

climax

STEWART & STEVENSON SERVICES, Inc.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas. Phone WOodcrest 9691.

Branches: Corpus Christi, Dallas, Lubbock, Wichita Falls, San Juan, Odessa.

Representatives: San Antonio, Longview, Brownsville.

DON'T REPLACE

Your broken castings

THEY CAN BE REPAIRED

The GUTH-PASCOE Way

- No matter how badly broken your casting is, it can be repaired the Guth-Pascoe way!
- Guaranted as good as new and up to the manufacturer's original specifications.
- All ferrous and many non-ferrous castings, simple or complex, can be restored by the Guth Fusion Process.

Investigate GUTH-PASCOE when an emergency arises. A combined experience of 72 years is your guarantee of fine craftsmanship in the restoration of broken castings.

1933 East Washington St., Phoenix, Ariz.

Phone: ALpine 4-0391

GUTH-PASCOE COMPANY

FOR SALE: DIESEL HOME STUDY Course by West Coast University, formerly offered under the name of Hemphill Diesel & Automotive Schools. Consists of 49 lessons. Those interested in the outright purchase of manuscript, offset plate negatives, and copyrights, please communicate with West Coast University, Extension Division, 1601 S. Western Ave., Los Angeles 6, Calif. This course will be sold to the highest offer by May 31, 1954.

BOOST HORSEPOWER

50% or more

WITH MIEHLE-DEXTER SUPERCHARGERS

- For Internal Combustion Engines
- Blower and Air Compressor Operations
- 100-750 H.P., 15-4000 cfm., 2-15 psig.

MIEHLE-DEXTER SUPERCHARGER

Division of Dexter Folder Company

100 Fourth Street, Dexter, Wisconsin

MD

NEW FROM DEALER'S STOCK

1879 Buda Heads

Old #DE12128B

New #13290 or DE13967B

With Valves & Springs

List Price Over.....$500.00 each

Our Price, Lots of 6.....$75.00 each

Our Price, Lots of 3.....$100.00 each

Lots of 50 — Write us

Delco Remy Starters New No. 1108734 & 32—$12.50

12 volt

All F.O.B. East Coast

ELECTRO DIESEL CORPORATION

P. O. Box 4842, Normandy Branch

Miami Beach 41, Florida

Gulf Coast Diesel News

By Michael T. Pate

HOUSTON Creosoting Company, Houston, Texas, has bought from Stewart & Stevenson Services, Inc., a series 71, General Motors diesel, rated at 75 hp. and equipped with torque converter which will be used to replace a steam engine on a yard locomotive crane unit.

W. E. McBRIDE, Winnie, Texas, has bought from Mustang Tractor & Equipment Company, Houston, a model D-318 Caterpillar diesel, delivering 113 hp. at 1800 rpm., which he will use to drive a deep well irrigation pump.

A. W. DAVIS & C. M. Crosby, Velasco, Texas, are installing a 165 hp. General Motors diesel marine propulsion unit, series 71, to drive their shrimp trawler through a 2:1 reversing and reduction gear.

TEXAS Gulf Producing Company, Houston, has bought through Buda Engine & Equipment Company, Houston, six Onan diesel units, model DSP-1-R-4. These single cylinder, 3 kw. air-cooled units will be exported by the company for auxiliary lighting use on the company's foreign operations.

TOM Henderson, El Campo, Texas, has bought from Mustang Tractor & Equipment Company, Houston, a model D-13000 Caterpillar diesel equipped for operation on dual fuel which he will hook up to a deep well for irrigation purposes.

E. W. & A. P. DuPont, Inc., Morgan City, Louisiana shipyard, has installed a Stewart & Stevenson General Motors dieselized ac. generator set, rated at 60 kw. output, to furnish power for electric arc welding.

SCHLUMBERGER Well Surveying Corporation, Houston, is powering ten skid-mounted logging devices for installation on oilwell drilling rigs with as many model 6DT468 Buda diesels, rated at 75 hp. The equipment was secured through Buda Engine & Equipment Company, Houston.

M. J. RHOADES, Galveston, Texas, has installed on his 35-foot shrimp trawler a General Motors series 71, marine propulsion unit. The diesel is equipped with a 2:1 hydraulic reduction and reversing gear.

CLEGG & Hunt Drilling Company, Houston, has bought through Houston Engine & Pump Company, Houston, two model 12 Murphy diesels driving 75 kw. ac. generating sets which the company will use to furnish auxiliary power on an oilwell drilling rig.

"AMOT" THERMOSTAT

"PERFORMANCE WITHOUT TROUBLE" is the reason more engine manufacturers, pipe lines, power plants, oil companies and shipyards are using AMOT as standard for Automatic engine water and oil temperature control.

AMOT Thermostats Offer the Following Advantages:

1. **Large capacity combined with light weight.**
2. **Excellent reliability even under extreme shocks and vibration.**
3. **No external bulbs or tubing to break and cause trouble.**
4. **Temperature is fixed and cannot be tampered with by operator.**
5. **Holds close regulation and is not sensitive to pressure.**
6. **Operating forces are very large and with no packing glands there is no chance of valve ever sticking or becoming inoperative.**
7. **Because of its simple and rugged construction, practically no maintenance is ever required.**
8. **Has positive 3-way valve action in which full pump capacity flows through the engine at all times.**
9. **Compact in size and will operate in any position, which facilitates piping.**
10. **Available in pipe sizes up to 6" for all types of gas engines, diesel engines, and compressors.**

Write for Catalog and name of your nearest AMOT Representative

AMERICAN MOTORS CO.

RICHMOND CALIFORNIA

Grinding and Hard-Chrome Plating of Diesel Engine Crankshafts — All Sizes

Complete facilities for grinding, plating, Magnafluxing, and electrically-controlled heat-treating. Largest hard-chrome plating plant in Mid-Continent area. ***Experience • Quality • Precision***

LANE PLATING WORKS 5322 Bonnie View Road • P.O. Box 9115

Phone FRanklin-1351 • DALLAS, TEXAS

RECLAIMED

Plungers & Bushings

GM 71, GM 567, GM 110, GMC TV 55, GM 268, 278

Tips, Crown Check Valves & Check Valve Seats

Complete Injectors

GM 71, GM 110, GM TV 55

Write for Prices and Dealer Proposition Today

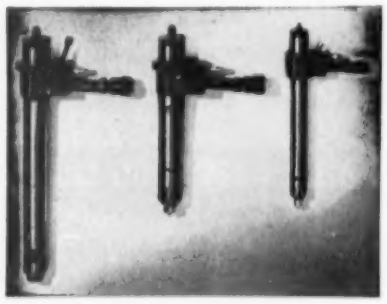
HANCOCK DIESEL SERVICE CO.

300 Walnut St. Findlay, Ohio

YouCanDependOn

ADECO

The ADECO Model "P" Single-Unit Fuel Injection Pumps are of the "port-control" type. Simple and rugged in construction and precision built by ADECO craftsmen, these pumps are extremely reliable.



ADECO injectors are available in four sizes and a number of different styles and lengths. The ADECO water-cooled Injectors are made in size No. 4 only, and have built a reputation for excellent performance where heavy fuel oils are burned.

When Ordering Fuel Injection Equipment

SPECIFY ADECO!

●

ADECO PRODUCTS

INCORPORATED

Designers and Manufacturers of Diesel Fuel Injection Equipment

5435 N. Wolcott Avenue, Chicago 40, Illinois

ADVERTISERS' INDEX

Adeco Products, Inc. 96
Aerofin Corporation 94
Air-Maze Corporation 21
Allison Division of General Motors 19
Aluminum Company of American 85
American Air Filter Co., Inc. 6-7
American Locomotive Co. 65
American Motors Co. 95
Ashland Oil & Refining Co. 32

Baldwin-Lima-Hamilton Corp. 14-15
Bendix-Skinner Div.,
Bendix Aviation Corp. 75
Briggs Filtration Co., The 82
Brodie System 92
Brush Aboe, Inc., Petter Engine Div. 30
Burgess-Manning Company 87
Burnett Machinery (Canada) 83

C. A. V. Ltd. 66
Cleveland Diesel Engine Div.,
General Motors Corp. 2
Cleveland Hone & Mfg. Co. 78
Cook Mfg. Co., Inc., C. Lee 62-63
Cooper-Bessemer Corp. ..... Fourth Cover

DeLaval Separator Co., The 16
Delco-Remy Div.,
General Motors Corp. 24-25
Diamond Chain Co., Inc. 23

Eaton Manufacturing Co. 88
Eclipse Machine Div.,
Bendix Aviation Corp. 72
Electro-Motive Div.,
General Motors Corp. 4
Elliott Company ..... Third Cover
Erie Forge & Steel Corp. 20

Fairbanks, Morse & Co. 8
Fram Corporation 74

General Motors Corp.
Allison Division 19
Cleveland Diesel Engine Div. 2
Delco-Remy Div. 24-25
Electro-Motive Div. 4
Guth Company 72
Guth-Pascoe Company 95

Hancock Diesel Service Co. 95
Harnischfeger Corp., P & H Diesel Div. 78
Hilliard Corp., The 93

Kato Engineering Co. 93

Lake Shore Electric Corp. 69
Lane Plating Works 95
Lewis Company, Warner 84
Liquidepth Indicators, Inc. 92
Luber-Finer, Inc. 77

Marquette Metal Products Co., The 27
Massey Machine Co. 94
Metalock Repair Service, Inc. 82
Miehle-Dexter Supercharger Div. 95
Murray & Tregurtha, Inc. 80

National Metal & Steel Corp. 92
National Supply Co., The 17

Oxy-Catalyst, Inc. 5

P & G Mfg. Co. 9
Palmer Electric Mfg. Co. 79
Pierce Governor Co., Inc., The 87
Powers Regulator Co., The 31
Pritchard & Co., J. F. 22

Quincy Compressor Co. 10

Schoonmaker Co., A. G. 94
Scintilla Div.,
Bendix Aviation Corp. 29
Shell Oil Company 13
Sinclair Refining Co. 89
Sola Catalytic Co. 93
Standard Oil Co. of California 73
Standard Oil Co. (Indiana) 81
Sterling Engine Co. 12
Stewart & Stevenson Services, Inc. 94
Sticht Co., Inc., Herman H. 92
Sturtevant Co., P. A. 92

Texas Co., The ..... Second Cover-1
Thomas Flexible Coupling Co. 91
Trane Co., The 26

U. S. Hoffman Machinery Corp. 87

Warner Lewis Company 84
Winslow Engineering Co. 67
Woodward Governor Company 28
Worthington Corporation 18

Young Radiator Co. 11

Another forward step in ELLIOTT Turbocharger Progress...

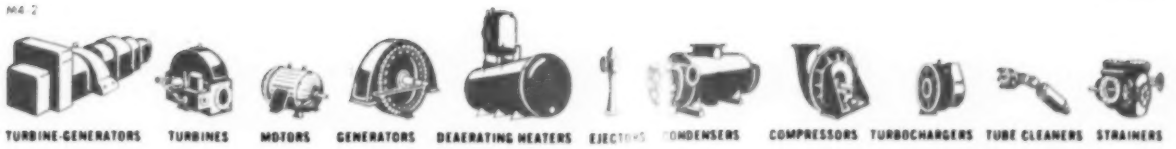
Cooper-Bessemer announces new turbocharged 2-cycle engine

ELLIOTT TURBOCHARGERS have played a vital part in the development of diesel and gas engine power. Now, in this *first* Cooper-Bessemer *turbocharged two-cycle engine* for commercial use, the Elliott name once again is significant. More than 13 years of refinements in engineering design and manufacturing have combined to produce a turbocharger that offers HIGHER PRESSURE RATIOS, IMPROVED EFFICIENCY and MORE AIR FLOW.

For the full story on Elliott Turbocharging contact your nearest Elliott representative or write Elliott Company, Supercharger Department, Jeannette, Pa.

ELLIOTT Company

M4-2



3 years in a row
Cooper-Bessemers help
R.E.A. Plants win top awards

For the third straight year, the DIESEL PROGRESS Bronze Plaque, for the most efficient and economically operated Rural Electrification Administration plant, goes to a co-operative equipped with Cooper-Bessemer engines.

In 1953, as in 1952, Wolverine Electric Co-op's Johnson Plant at Hersey, Michigan, was the *first* choice. Here, three Cooper-Bessemers are part of the engine team that generated power throughout 1953 at an adjusted net operating cost of only 6.48 mills per kilowatt hour. The top award of 1951 was presented to the Graham County Electric Co-op, Pima, Arizona, powered by five supercharged Cooper-Bessemer Gas-Diesels.

Eight of the fifteen awards presented during the history of the competition have gone to R.E.A. plants powered exclusively by Cooper-Bessemer units. Power for *two* additional award winning plants has been shared by Cooper-Bessemers. *Ten out of fifteen* . . . an impressive record of dependable performance, lasting economy and minimum maintenance.

Such *consistent* operating efficiency, low maintenance, and lasting economy can go to work for you, too. For heavy-duty power needs . . . Gas-Diesel, Diesel or gas engines . . . remember Cooper-Bessemer. Consult with our nearest representative who will gladly work with you on your power problems.

New York City • Seattle, Wash. • Bradford, Pa. • Chicago, Ill. • Dallas, Houston, Greggton, Pampa and Odessa, Texas • Washington, D. C. Shreveport, La. • San Francisco, Los Angeles, Calif. • St. Louis, Mo. Gloucester, Mass. • New Orleans, La. • Tulsa, Okla.

MOUNT VERNON, OHIO
COOPER-BESSEMER
GROVE CITY, PENNA.

DIESELS • GAS ENGINES • GAS-DIESELS • ENGINE-DRIVEN AND MOTOR-DRIVEN COMPRESSORS